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The FOUNDRY

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Editorial

Many Contribute To Progress Of the Foundry Industry

EVERYONE familiar with the manufacture of castings in the early days of the century must be impressed at the progress represented by modern practice and products of the foundry industry. Today all four branches—gray iron, malleable, steel and nonferrous—are producing castings having both physical and metallurgical properties undreamed of or at least considered impossible of successful production in the decade prior to the World war.

Who has been responsible for the spade work in the gradual evolution of an industrial picture? In any survey of contributors, much credit should go to those progressive foundries that have applied modern engineering practices to the solution of foundry problems, thus making a science of an industry which formerly was classified as an art. Specialty plants, as for example foundries engaged in the production of automobile castings, chilled car wheels, cast iron pipe, agricultural implements, and numerous others, have been prolific contributors to progress in the field of castings manufacture. Individually or in groups, such foundries have developed practices which have permitted them to meet the ever increasing demands for castings with higher physical properties. Pioneers in these various fields have applied engineering research to the solution of foundry problems, and the results have been excellent. Considering the possibilities which modern castings offer to practically every field of design and construction, the research of past years has resulted in the development of practically a new industry.

In giving proper credit for this scientific evolution of an industry, attention must be directed to the part played by the technical and trade associations which serve the interests of foundries, either generally or in specialized fields. These organizations have made group action possible, and have aided greatly in the improvement of manufacturing methods, products, employe relations, public relations, customer relations, and quite frequently profits. As has been mentioned on several occasions by the writer, the greatest possibilities for further progress in the foundry industry lie in increasing the activities of the various organized groups functioning within the industry. The trend in numerous fields is toward the greater use of castings as engineering materials, and this trend can be continued through co-operative action.

All too often, when considering the various factors responsible for the present high position of the foundry industry, foundrymen fail entirely to recognize or appreciate the important contributions to foundry progress which have been made by the manufacturers of foundry equipment, supplies and essential materials. It is doubtful if foundries could continue to function at the present high plane of excellence for any length of time following the complete withdrawal of assistance constantly given by the equipment and supply men. Of course, these contributions have a selfish motive. As in the case of the foundry which tries to make a better product in order to produce a profit for the company, the manufacturer of equipment or supplies tries to be of greatest service to the foundry industry for the express purpose of producing profitable business for his own organization. Reasons back of these contributions detract nothing from the valuable services rendered.

Backed by research, engineering study and the application of practical foundry knowledge, companies in the equipment and supply fields provide the tools and raw materials required in present day foundry practice. Almost as important, from the standpoint of foundry progress, is the fact that these companies maintain sales and service organizations composed of experts in their particular fields and frequently past masters in the intricacies of foundry practice. An outside observer might well believe that this group of men, at times, displays a more active interest in the welfare and development of the foundry industry than many foundrymen.

Equipment and supply vendors and service men should be most welcomed visitors at any foundry. These men are excellent sources of information on new materials, equipment and methods, which will permit the foundrymen to solve the ever present problem of producing better castings at a lower cost. Since usually the products sold by these men cannot function properly unless the foundry practice is correct, one of the most important jobs of field men is to check practices and recommend changes where necessary. Without doubt, many foundries depend heavily on this excellent service.

Vendors play an important part in the functioning and development of the national technical association, the various chapters and local associations. They serve as officers and directors, as committee members and participate in technical programs. A check of reports of meetings of chapters and local associations indicates that well over half of the speakers are representatives of manufacturers of equipment and supplies, or organizations serving foundries.

Equipment and supply vendors really are a part of the foundry industry; a most important part.

Frank G. Steinebach
Editor

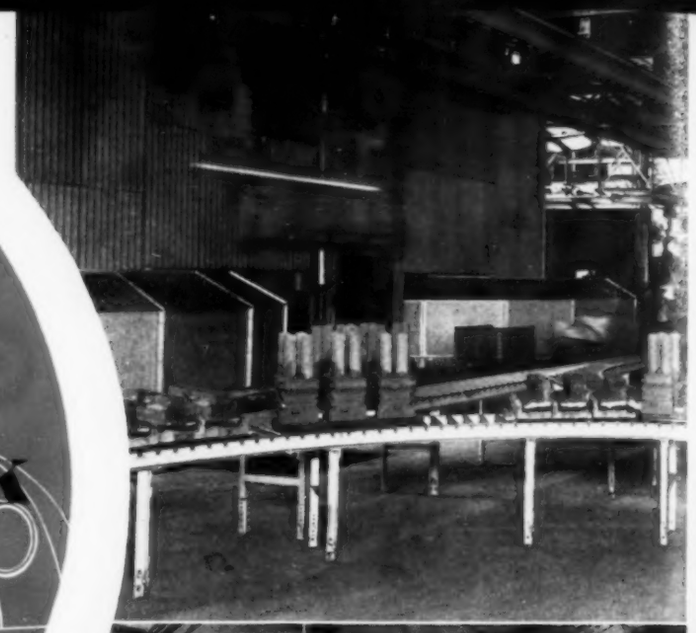
New Foundry INTERNATIONAL BUILDS TRUCK ENGINES

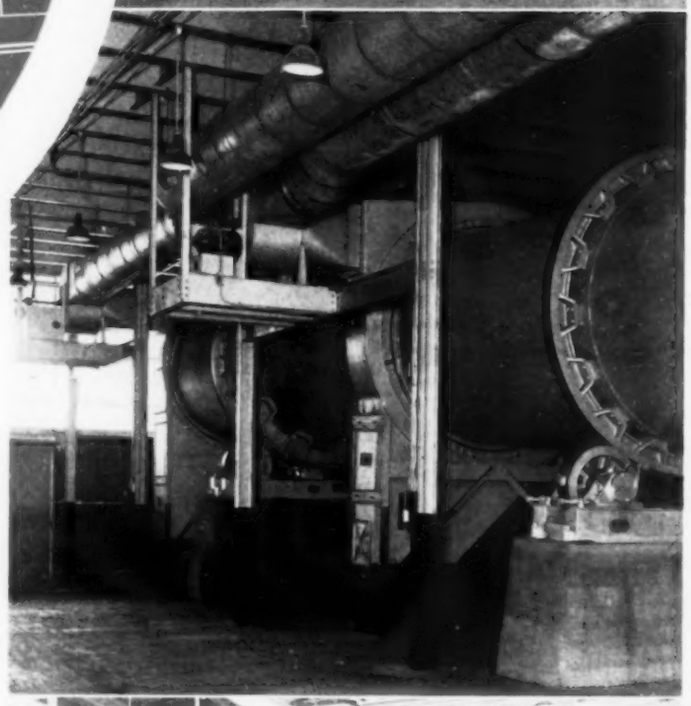
By PAT DWYER

SEVERAL features in connection with the core-making department of a gray iron foundry recently completed by the International Harvester Co., in Indianapolis were touched upon in an article published in the January, 1940 issue of THE FOUNDRY. The reference necessarily was brief in a general description which attempted to present an over all coverage of the latest and most modernly equipped of the many foundries operated by the company. The accompanying illustrations show some of the mechanical equipment designed to facilitate operation and to insure accuracy and uniformity in the finished product.

Molding and core sand are stored in a number of large concrete bins protected by a high roof on the west side of the main building and extending from the north end for a distance of 300 feet toward the general raw material storage yard. A crane runway extends from end to end of this area and supports three 10-ton electric traveling cranes. Under normal conditions two cranes operate in the general yard, handling materials for the cupola, while the third crane handles the sand. The core sand bin 25 feet high with battered walls 66 x 78 feet apart at the top, has a capacity of 6850 tons, approximately the content of 137 loaded 50-ton cars.

Comparatively heavy consumption of new sand in relation to the tonnage of castings is due to the fact





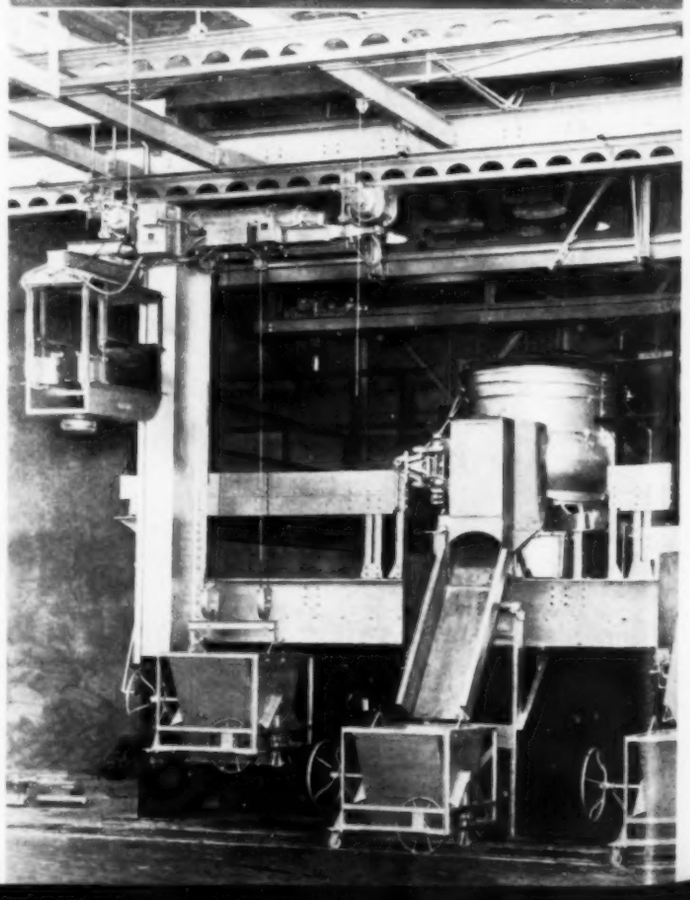
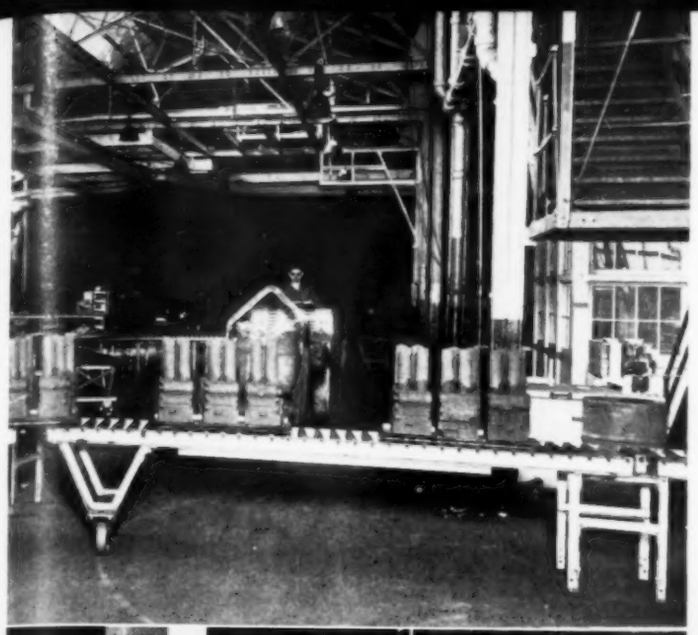
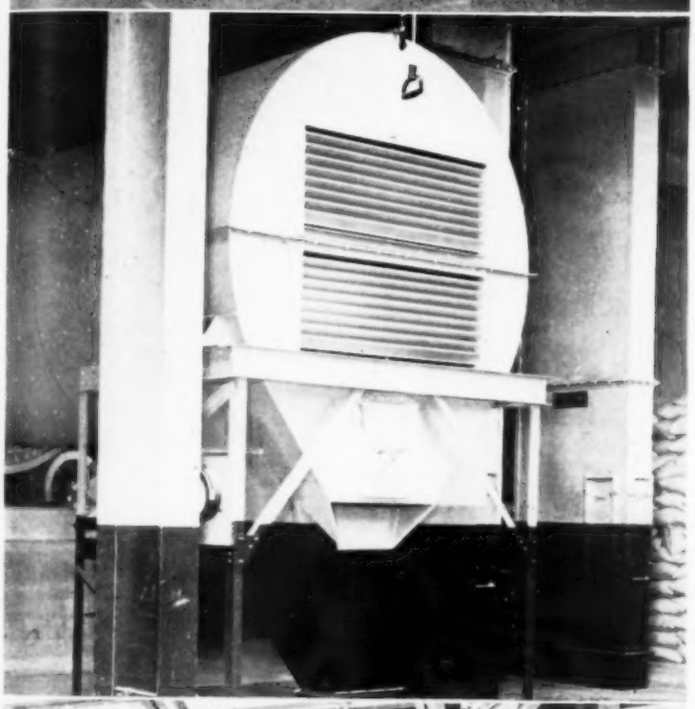
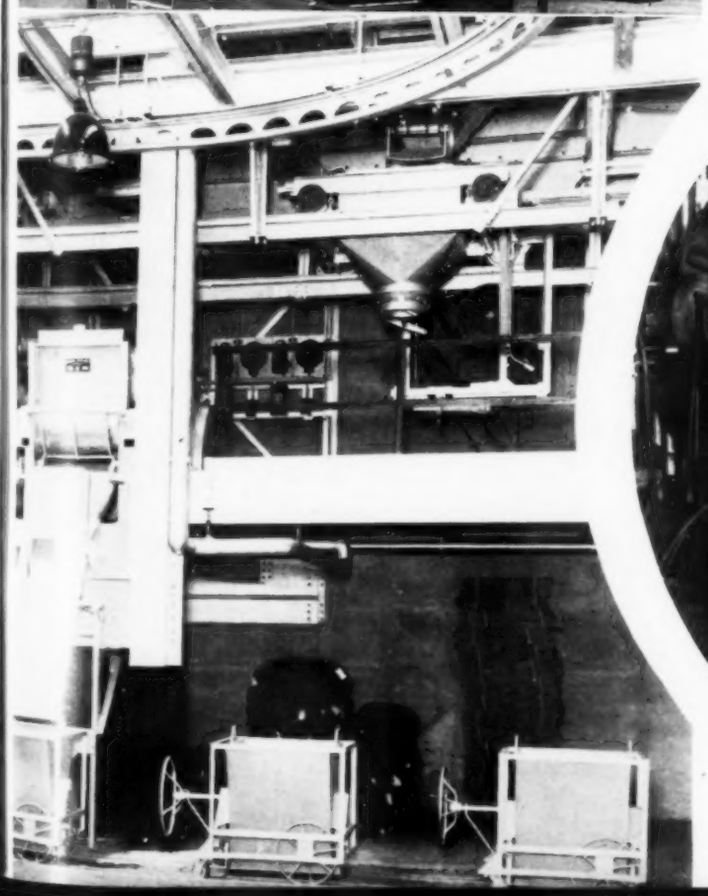


Fig. 15 (Top)—View showing swinging opening in roller conveyor for handling cores which permits passage of plant trucks. Fig. 16 (Center)—Dryer used to dry core sands. Fig. 17 (Bottom)—Core sand mixing platform with muller type machine at left and paddle type machine at right. Automatic weigh-larry delivers sand from hoppers overhead to mixing machines. Fig. 18 (Extreme Right)—Making and setting drag half of molds on conveyor of large unit. Turntable and sandslinger shown in right background



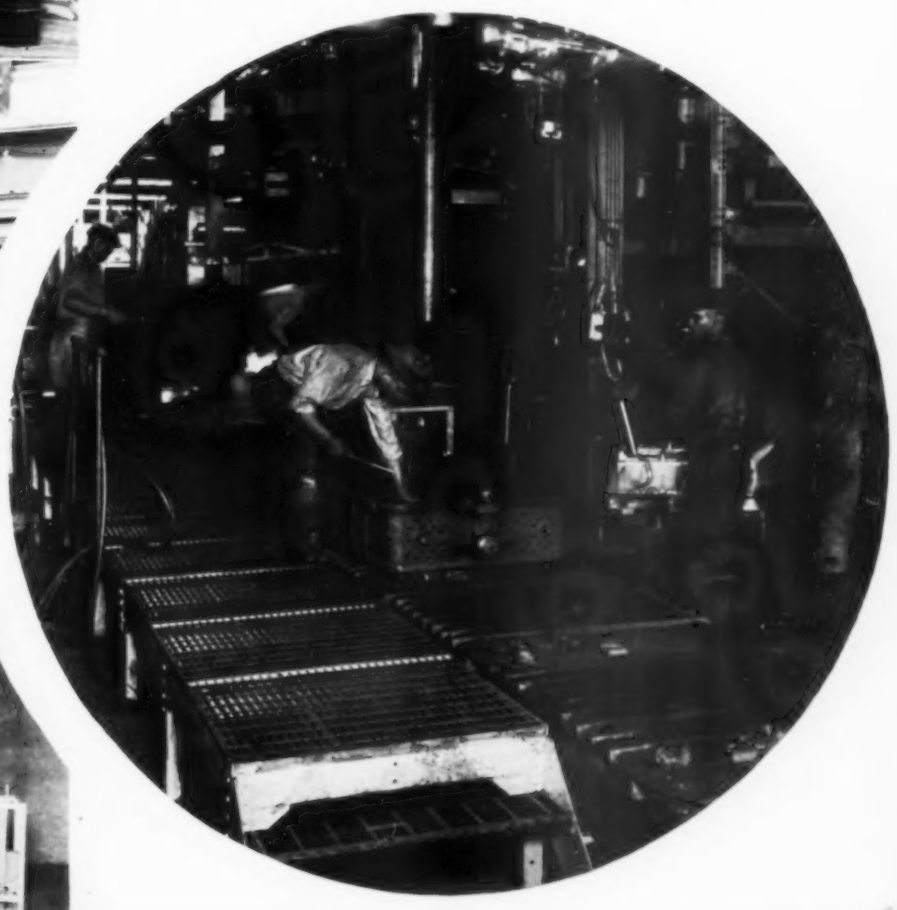




that up to the present no attempt has been made to reclaim any of the used sand or incorporate any in the core sand mixtures. The subject is under investigation, but in the meantime, the sand is used once and then discarded. At the core knock out station the sand falls onto a belt which discharges into a railroad car in the yard. This has reference to the cylinder blocks and cylinder heads into the construction of which dry sand cores enter so extensively. After they are shaken out these castings are attached to hooks on an aerial conveyor total length, 3400 feet, arranged in loops and running at a speed that brings the casting back to the chipping and grinding department in 6 hours. Part of the cooling conveyor is mounted close to the roof over the sand bins. A wire net underneath constitutes a safety feature in the somewhat remote event of a casting slipping or falling from one of the hooks.

To insure a constant supply of core sand practically free from moisture, sharp sand and bank sand are treated in a long steel revolving drum 8 feet 6 inches in diameter and 63 feet 6 inches in length. Moisture is reduced to 0.5 per cent and the sand is delivered to the bins at a temperature under 100 degrees Fahr. Nominal capacity of the dryer-cooler is 20 tons of sand per hour. Drying is accomplished through a combination of direct and indirect heating. Butane gas is burned in a cylindrical brick lined furnace under automatic control. On 8 per cent wet sand the device requires about 6,100,000 B.t.u.'s. Damp, raw sand is loaded into a 50-ton feed hopper by a crane with clam shell bucket and is fed out by an 18-inch apron feeder into the dry feed chute. Tonnage of sand is regulated by an adjustable gate.

When the sand is nearly dry it flows automatically through a special port into the cooling section of the cylinder where it flows counter current to the movement of the cooling air supplied by a fan and later



discharged through the roof of the building. Final traces of moisture are removed in the cooling section. Latent heat of evaporation of the residual moisture rapidly reduces the sand temperature. Dried and cooled sand passes through a screen which removes any foreign material. A recording thermometer provides a continuous record of the sand temperature.

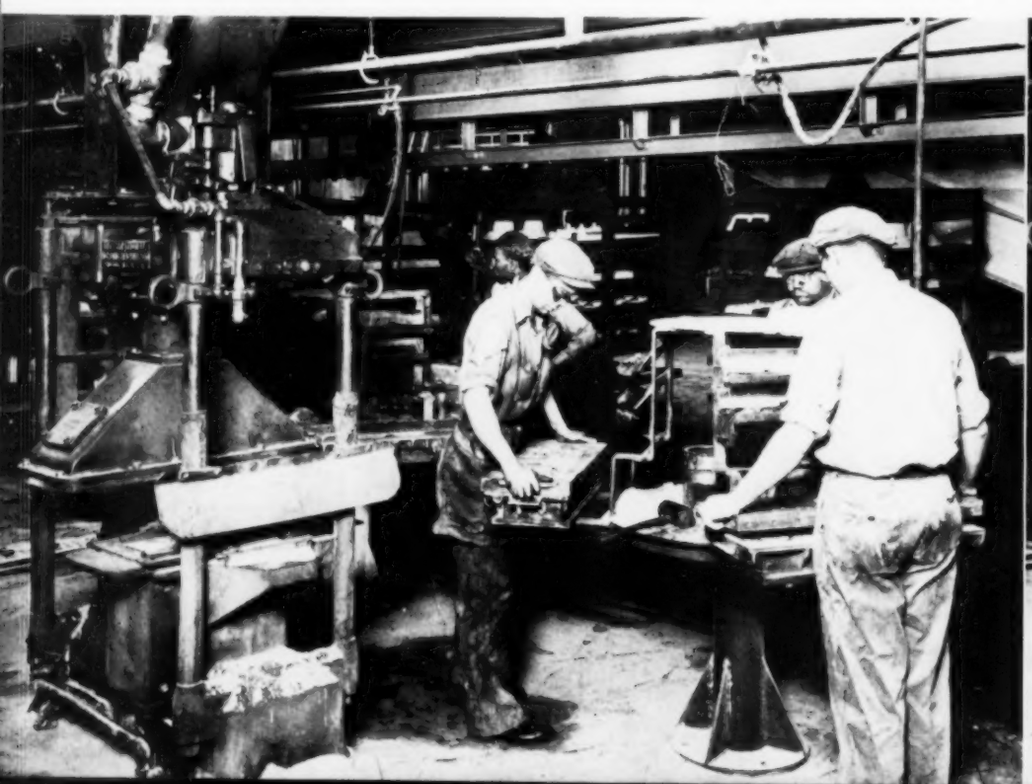
The dried and cooled sand passes to an elevator and thence over a flat belt conveyor to any one of four 80-ton capacity dry sand storage bins equipped with rack and pinion slide gates. A belt under the bins carries the sand to an elevator and thence to another belt conveyor which distributes the dried sand to the batch bins high above the mixer platform. A loading car operated electrically and with a spout extending from the bottom travels back and forth over the mixers. A measuring chamber in the bottom of each hopper discharges a given amount of sand into the loading car which then is spotted above either one of the mixers. When a slide is released in the spout the sand falls into the mixer.

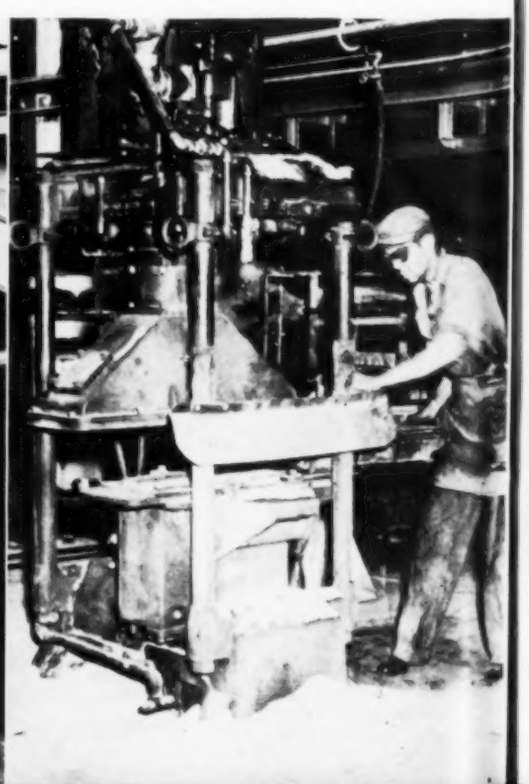
Two kinds of sand can be withdrawn as required at the rate of 50 tons per hour. The storage bins serve as an elastic link between the 20-ton per hour dryer capacity and the 50-ton per hour demand for sand at the mixers. Two mixers for preparing the sand are located on a mezzanine floor on the west side of the core room. One is a muller type machine in which the sand and binding agent are blended through the action of two rollers revolving in a steel pan. The other is a paddle type mixer in which two narrow, helical blades mounted on a central shaft and designed to just clear the rounded bottom of a longitudinal pan or trough, toss the sand violently to secure a uniform mixture of sand and binder. An elaborate series of control apparatus and recording instruments regulate the amount of sand, water and binder in each batch. An operator is on hand to set the mixers in motion, but they stop automatically at the end of a carefully predetermined set period. Possible variation in the mixture through inattention, carelessness, lack of experience or fallible human judgment on the part of an operator is entirely eliminated.

A chute from each of the mixers conducts the prepared batches into a number of steel buckets equipped for suspension from an overhead carrier, and also provided with wheels for movement on a short length of narrow gage track in front of the chutes. Thus while a bucket is taking a load under each chute, empty buckets may be placed on the track to be shoved into place under the chutes when the loaded buckets are carried away. The hoist operator travels in a cab suspended from a monorail and through suitable switches can deliver a load of sand to any of the core-making stations. Steel hoppers are located over the sandslinger, the blowing machines and the benches. The system of sand delivery is elastic in that individual hoppers can be replenished as required. Obviously the consumption of sand is greater at some stations than at others.

Method of producing the upper crankcase and barrel cores in three sections for a 6-cylinder engine was described in a preceding article which appeared in the January issue of THE FOUNDRY. Two of the present accompanying illustrations show activities around one of the core blowing units where water jacket cores are made. This is one of seven similar units devoted to the production of a wide variety of small and medium size cores. The battery is parallel with and adjacent to one of the three continuous ovens in which the racks are suspended from a conveyor chain. In the particular instance illustrated, a small turntable mounted on a pedestal at a convenient height is located close to the blowing machine. One operator removes the corebox from the core, places the core on a nearby core oven rack, reassembles the corebox, sets the reinforcing and vent wires and then revolves the turntable through

Fig. 19 (Left)—Core is removed from box, and wires are inserted for next core. Cover then is replaced. Fig. 20 (Center)—Operator lifting core box from machine preparatory to removing core. Fig. 21 (Right)—Operator skin drying mold with a gas torch on large molding unit





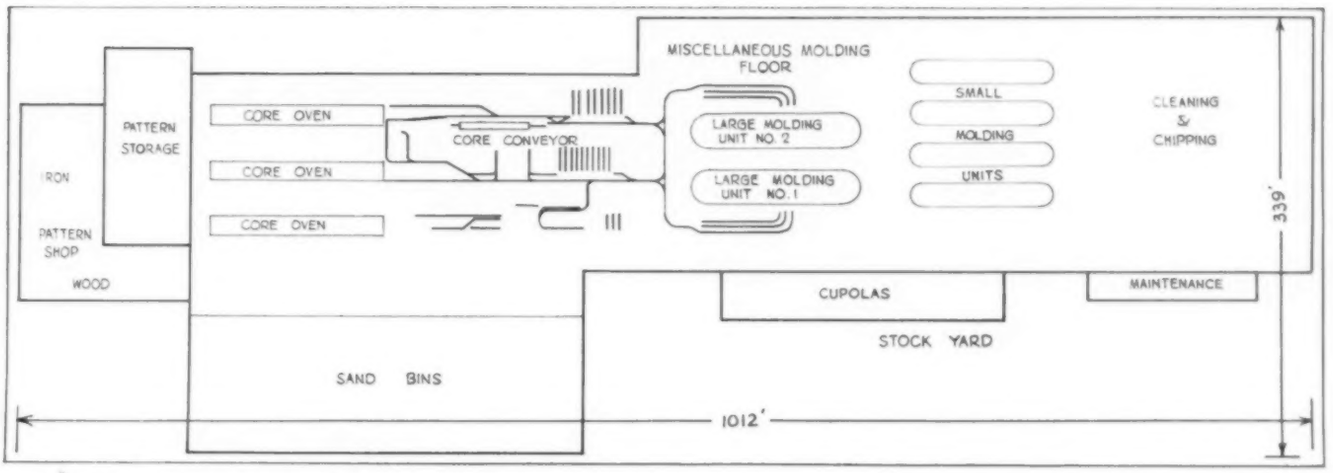


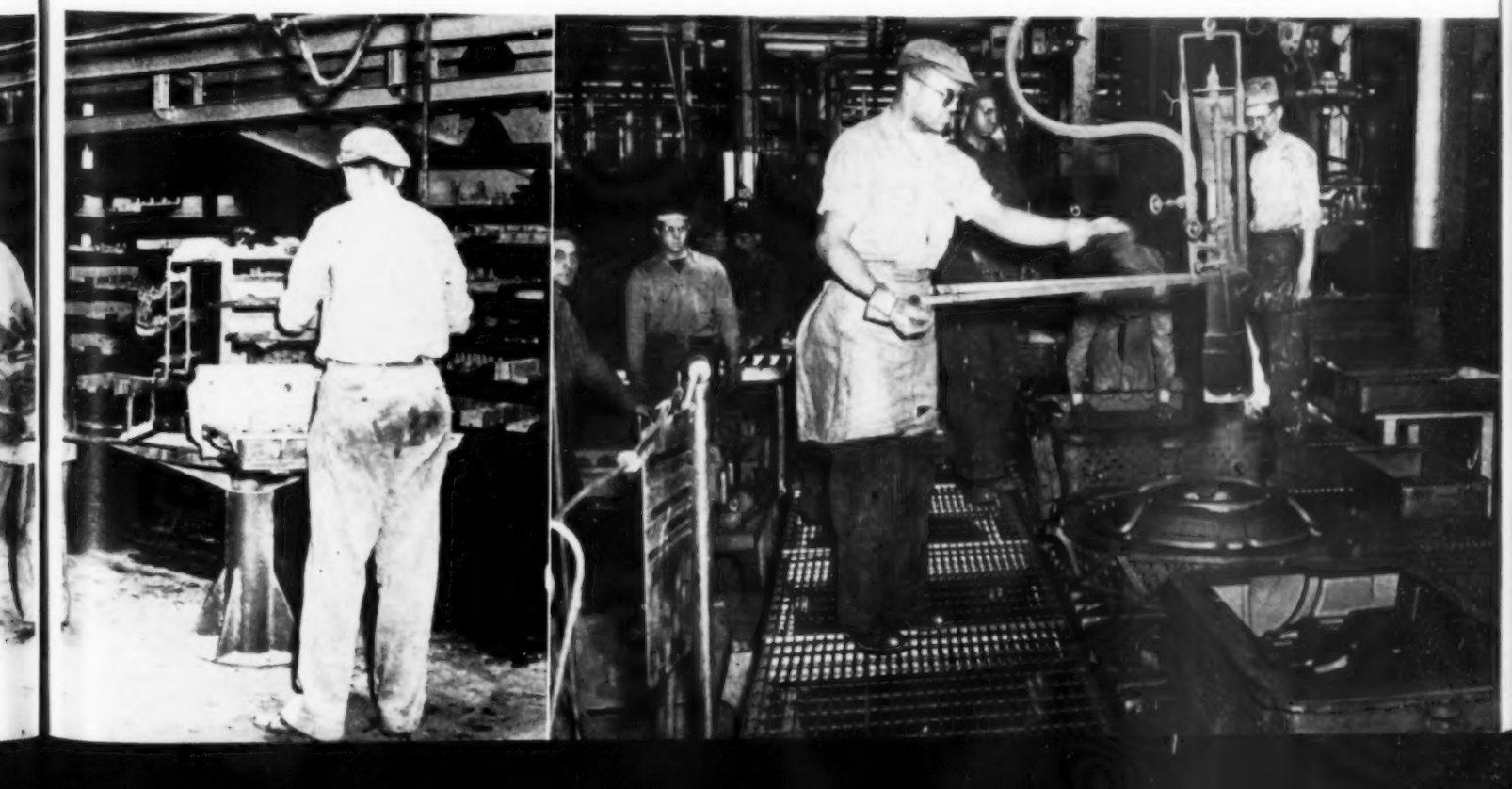
Fig. 22—Sketch of the building layout showing the location of various units in relation to each other. Total length of the building is 1012 feet and the width is 339 feet

an arc of approximately 180 degrees. In the meantime the second operator has placed a duplicate corebox on the table of the machine, operated the valve through which sand under compressed air pressure is driven into the box, released the clamping mechanism and has placed the corebox and core on the turntable. The cycle is repeated constantly with the speed, skill and deftness of hand and eye usually associated with surgeons or artists in the so-called higher spheres of human endeavor.

All cores are made in the north section of the building. The word section would seem to imply a partition or dividing line, but that meaning does not apply in this foundry where the floor is open from end to end and where wide continuous gangways facilitate movement of men and materials. The only partition wall in the building is the one separating the pattern shop at the extreme north end. The pattern shop is provided with necessary tools and equipment for the manufacture and repair of wood and metal patterns. A walled off section houses a tool crib, pattern storage and a store room for miscellaneous foundry supplies. The second floor has a locker and wash room equipped with circular wash basins and several batteries of shower baths. Each employe hangs his clothing on a pendent support and then with a small chain pulls the garments up close to the roof where they are aired and dried.

Coming back to the core room after this slight digression, the cores in different classifications are made at three stations, each station parallel and adjacent to one of the three continuous type ovens, elevated about 9 feet above the floor except at the two points where the cores are loaded and discharged. Main features of oven operation were covered in a previous article. Before the cores arrive at the discharge end of the ovens, they are subjected to a blast of cold air which serves the double purpose of removing any accumulated dust, and of cooling the cores rapidly to a temperature which permits handling them readily.

From the checking and inspection benches many cores are taken directly by truck to the vicinity of the molding units. Others are stored on a series of short roller conveyor units. The comparatively complicated set of cores for the cylinder (*Please turn to page* 84)



THE FOUNDRY INDUSTRY and Army Ordnance

BY COL. NORMAN F. RAMSEY
Rock Island Arsenal
Rock Island, Ill.

IN AN emergency the needs of the arms and services of the war department, such as the quartermaster corps, the engineer corps and the air corps, but excluding army ordnance, are, to a large extent, similar to their commercial peace-time needs, except they are on a much larger scale. Foundrymen are familiar with the requirements of these arms and services which are generally of a commercial character and in most cases can meet the war-time load by an expansion of facilities.

Industry Holds Promising Future

So far as ordnance is concerned the peace-time load is relatively light and few foundries have the opportunity to become familiar with ordnance material which is almost entirely noncommercial in its character. However, the foundry has had an illustrious and glorious past. It is having an active present. It holds a promising future.

Historical: German records show that cannon were cast of white iron as early as 1414 and a 5-ton gun called the *Basilicus* was cast in London in 1516. The early cannon from the fourteenth to sixteenth centuries generally were made of wrought iron, although the art of casting bronze was well known. Bronze was expensive for large castings and wrought iron was the stronger material. Cast iron round shot generally was employed up until about 1852. Both bronze and cast iron guns were used but the principal advances resulted from the graining of the powder. However, the guns were better proportioned. Some were real works of art and were given names such as *L Impetueuse* (meaning the impetuous one).

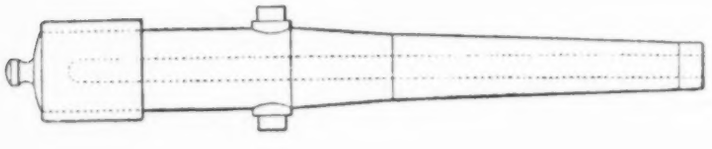
The great improvement in the manufacture of cast iron smooth bore guns was due to the introduction of General Rodman's method of casting by cooling from the interior, together with well designed exterior lines of the gun. The object of General Rodman's improvement was to improve strength through setting up a compressive stress in the bore. The method of casting is shown in Fig. 8.

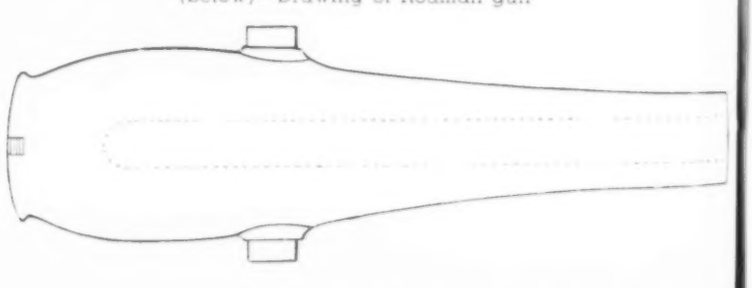
Made First Rifled Cannon

Our Civil war stimulated the production of cast iron guns, some of which weighed over 50 tons. The South Boston Iron Co., which was the original name of the Hunt-Spiller Mfg. Corp., was established by Cyrus Alger in 1827, who made the first rifled cannon in 1834. The gun iron produced by that company and its successor has been well known ever since. Other American foundries which obtained their early reputation and prosperity by making cast iron guns were the Builders Iron Foundry, Providence, R. I., and the Fort Pitt Foundry, Pittsburgh.

The Parrott guns, used extensively during the Civil war, were cast at the West Point Foundry, Cold Springs, N. Y., and were the first extensive system of rifled guns introduced into the United States. Their founder will long be recalled as one of our most successful gun makers. He rendered great assistance in producing new types of guns which built up and assisted greatly the knowledge of gun making in this country. The smaller calibers of the Parrott guns showed in some cases a remarkable endurance in war

Fig. 1 (Left)—Sketch of 4½-inch Parrott siege gun. Fig. 2 (Below)—Drawing of Rodman gun





This article, and one which will appear in April, is from a "paper" presented before the January meeting of the Wisconsin Chapter of the A.F.A.

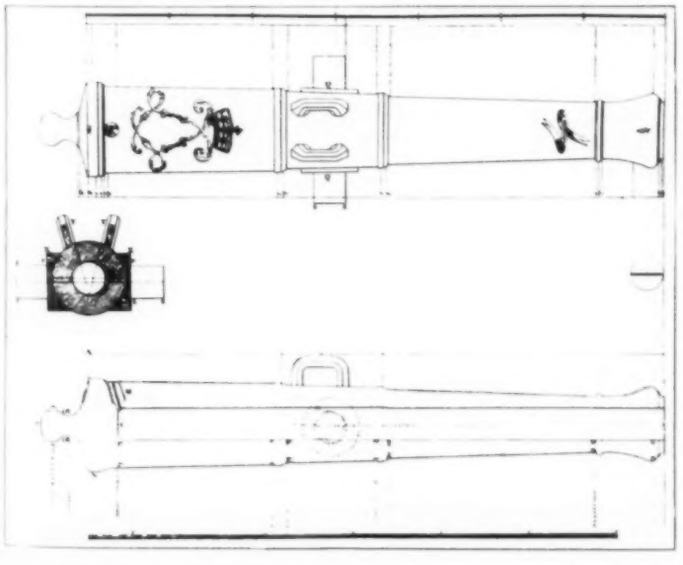
The Editors

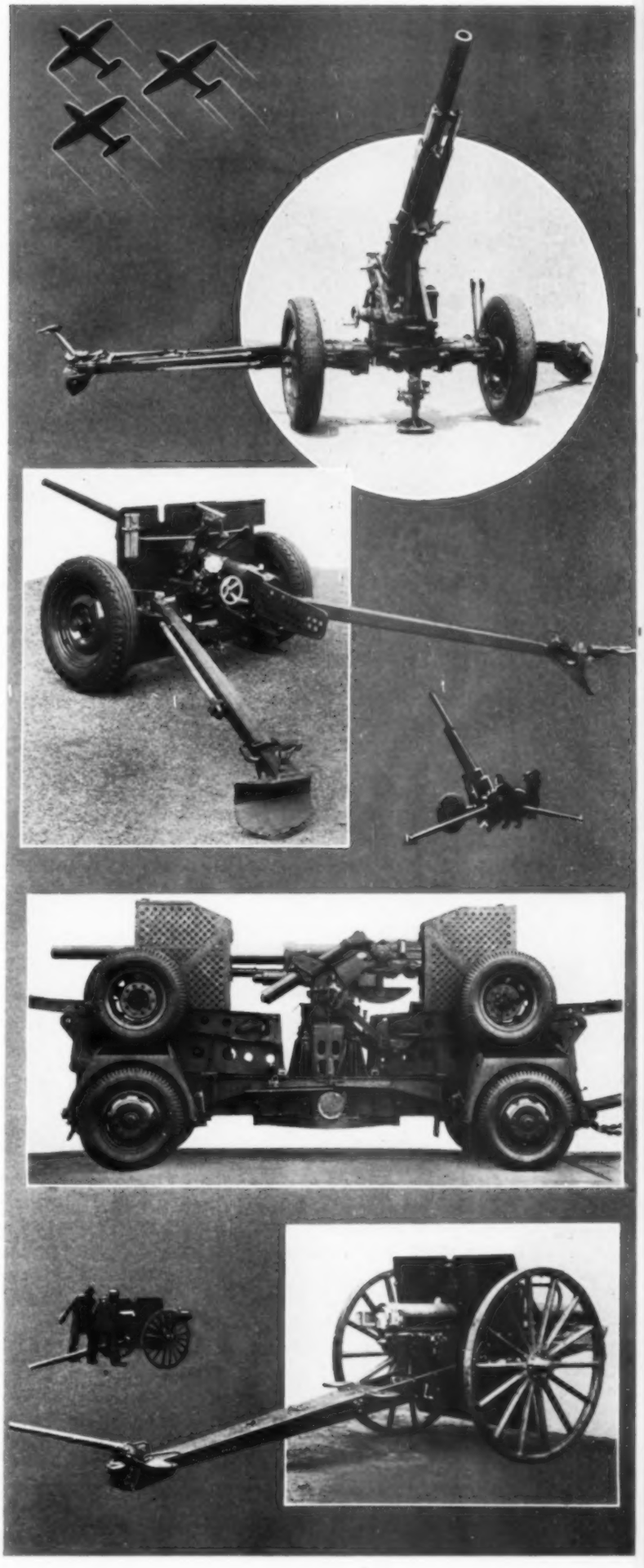
service but numerous failures occurred in the larger calibers.

In connection with the Civil war it may be of interest to note that between Jan. 1, 1861, and June 30, 1866 the Federal government purchased 7892 field, siege, and seacoast guns and mortars, the greater part of which were cast iron or bronze; 2,704,852 projectiles for smooth bore guns; 3,043,610 projectiles for rifled guns and 6,539,999 pounds of grape and canister shot. From those figures you can see that the foundry played a most important part in the Civil war.

The close of the Civil war found us with an established system of smooth bore, cast iron guns possessing great merit. However, we hardly had time to congratulate ourselves on having excellent reserves in quality and quantity when foreign powers made such great advances in rifled guns that we had to admit our inferiority. By 1871, the chief of ordnance had declared himself against the procurement of any cast iron, rifled guns for arming the forts. Nevertheless, the fight between the advocates of cast iron guns and steel guns continued for many years, aided in large part by the fact there were no steel making facilities in the country. It was essential that the steel guns coming into vogue be made in the United States but little attempt was made by (*Please turn to page* 78)

Fig. 3 (Below)—Plan and cross section of 12-inch French cannon. Fig. 4 (Top right)—75 millimeter gun carriage without gun weighs 2605 pounds. Steel castings weigh 119 pounds and bronze castings 39 pounds. Fig. 5 (Upper right center)—37 millimeter gun carriage without gun weighs 721 pounds. Steel castings weigh 41 pounds, bronze castings weigh 20 pounds, and alloy castings 2 pounds. Fig. 6 (Lower right center)—3-inch gun mount without gun weighs 13,605 pounds. Steel castings weigh 1619 pounds, bronze castings 258 pounds, manganese bronze castings 396 pounds, and aluminum castings 342 pounds. Fig. 7 (Bottom right)—3-inch gun carriage without gun weighs 1610 pounds. Steel castings weigh 86 pounds, bronze castings 131 pounds, and aluminum castings 6 pounds





COMMENTS OF F

PROGRESS in the various branches of the foundry industry during 1939 is revealed in a group of comments presented in the February issue of THE FOUNDRY, and completed in this issue. The comments originally were solicited by the editors of *Steel*, and were presented in part in the Jan. 1, Yearbook of Industry issue of that publication. Because the various discussions not only record past progress but also, in some instances, indicate future trends, they should be of special interest to readers of THE FOUNDRY.

Technical Training Course Conducted by Malleable Industry Aids Production

By F. O. PARKER
President
Malleable Founders' Society

DURING 1939 the malleable industry has devoted itself to keeping uppermost in the minds of its members the importance of an average high standard of quality. This has been stressed in past years but never more than during 1939. The results have been most gratifying. First, there has been a further improvement in the physical test results on specimens selected at random by the shop practice engineer and tested in the laboratory of the consulting engineer of the industry.

New also in 1939 was the technical training course conducted by the industry at Rensselaer Polytechnic institute. There during an 8-week summer course, young men sent from the various malleable iron plants were given an intensive course in metallurgy and foundry practice. Instruction was furnished by the metallurgical department of Rensselaer and the consulting and shop practice engineers of the Malleable Founders' society. The training received by these men will be a considerable factor in helping maintain in the future the quality of the material which they help to produce.

The society has a technical council made up of metallurgists and engineers from the various member plants. During 1940 many technical problems are to be studied and investigations made by this technical council. We look for important and effective results.

Developments in Steel Casting Industry Led to a More Useful Product

By W. C. HAMILTON
Research Director
American Steel Foundries, Chicago

DURING the past year there have been important developments in the steel castings industry which have have led to a better and more useful product.

Steel castings and weldings are both a necessary and desirable part of many steel structures. Much progress has been made in the proper adaptation of the casting. The designing engineer has co-operated with the foundry and has obtained better castings and also better structures in weldings.

The American Society for Testing Materials has adopted tentative specifications covering steel castings of the following types, all suitable for fusion welding: One, carbon-steel castings for miscellaneous uses; two, carbon-steel castings for service at temperatures up to 850 degrees Fahr.; three, alloy-steel castings for service at temperatures from 750 to 1100 degrees Fahr.

Low alloy steels for castings have been developed to meet the requirements of industry. In some cases such steels are desired to give more stability to a standard design. More often, due to their superior physical properties, they are employed to decrease weight, an outstanding example being the use of high tensile castings for railway equipment. High alloy-

FOUNDRYMEN *Reveal* A Year of Progress

steel castings for heat and corrosion resistance also have been used more extensively.

Improvements in methods of making steel for castings have been noteworthy. The shape and location of inclusions, formed as deoxidation products, have been recognized as important factors in determining the physical properties. New deoxidizers have been investigated, and the proper use of aluminum in acid electric steel has received much attention.

Studies covering sand mixtures have been sponsored by the steel castings industry, the work being done at well known institutions equipped for such investigations.

An outstanding achievement has been the successful casting of gear blanks by a centrifugal process. The manufacturer has made public the methods used, which action illustrates the development of a better interchange of experiences among steel foundrymen.

Studies of Core and Molding Sands at High Temperature Show Results

By HARRY W. DIETERT
President
Harry W. Dietert Co., Detroit

IN SPEAKING of foundry molding materials, one first must mention the rapid rate at which foundrymen are beginning to study the behavior of the sand in the mold or core at elevated temperatures.

There are three distinct phases that are receiving particular attention. The first, is that the sand in the mold or core must form a refractory vessel. To improve the refractoriness of the mold and core, foundrymen are choosing sand with high sintering temperatures and are taking the proper steps to keep the sand clean in the foundry.

Behavior of sand at elevated temperature, in reference to volume change of the sand in the mold or core is the second phase in this advancement of molding materials. The volume change of sand, as expressed in expansion at moderate temperatures and in contraction at elevated temperatures, is being controlled in part by material selection, blending preparation of the sand and in the degree of ramming.

The mold and also the core must possess a degree of strength at elevated temperatures to resist washing by molten metal. However, it must not, possess an excess of strength at the elevated mold or core temperatures to restrain the shrinkage of the casting. This new attack to the proper functioning of a mold is the third phase of the improved sand technique. Strength of the mold or core at elevated temperature is termed "hot strength." It is readily measured by means of a recently developed dilatometer. The furnace of this dilatometer will operate up to temperatures of 3000 degrees Fahr. The dilatometer may also be used to determine the expansion, contraction and collapsibility of molding and core materials.

The hot strength of molding sand is increased rapidly when the green strength, clay content, mold hardness and percentage of fines is increased. Rate at which a core collapses may be retarded by decreasing the core permeability or increasing the clay content of the mix. Practical results already obtained from the study of molding material at elevated temperatures insures that further study along these sand lines will form a prominent part of future work.

Notable Achievements in Castings Field Are Attracting Wide Attention

By W. R. BEAN
Vice President
Whiting Corp., Harvey, Ill.

THE year 1939 saw several notable achievements in the castings field and advances in a number of specific directions.

In gray iron melting equipment, the perfecting of a wet gas washer and dust collector applicable to all sizes of cupolas is an outstanding development. Cupola exhaust may now be as clean and unobjectionable as from the most perfectly cleaned industrial stack. Cinders and other coarse particles are eliminated entirely and the very fine material effectively caught through a series of water sprays, water curtains and baffles.

Demand for higher (*Please turn to page* 89)

A F A *Announces*

TENTATIVE CONVENTION PROGRAM

THE Foundry and Allied Industries show, which will open on Saturday, May 4, at the International Amphitheatre in Chicago for a preview arranged especially for the foundrymen of the Chicago area, promises to be one of the largest and most interesting ever held. The show will be staged by the American Foundrymen's association in connection with the forty-fourth annual convention of that group. While the show will open on Saturday, the sessions of the convention will start on Monday, May 6, and continue through the week, with both convention and show closing Friday afternoon, May 10.

Technical sessions held during exhibition hours will be in the meeting rooms of the Stock Yards inn and the Saddle and Sirloin club, buildings conveniently adjacent to the Amphitheatre. Evening sessions will be held at the Palmer house, the downtown headquarters of the convention. Registration headquarters for the men will be at the International Amphitheatre and for the ladies at the Palmer house.

A complete schedule of the week's events is shown in the accompanying box. This program has been arranged with general interest sessions throughout the week. Sessions of particular interest to the malleable and nonferrous divisions have been scheduled for the first part of the week.

The Chicago chapter, host to the convention, has arranged for many interesting, industrial plants and foundries to be open for inspection during the week. One general group trip has been arranged for the afternoon of Monday, May 6, to the works of the Wisconsin Steel division, International Harvester Co., where the coke and blast furnaces and steel mills will be inspected. Other plants open to inspection during the week are as follows: Carnegie-Illinois Steel Corp., South Works; Interlake Iron Corp.; Crane Co.; Link-Belt Co.; (*Please turn to page* 82)

Tentative Schedule for 1940 Annual Convention

Saturday, May 4

1:00 to 10:00 p.m.—Foundry Show (arranged especially for executives and shop men of the Chicago area).

Monday, May 6

9:00 a.m. to 5:30 p.m.—Foundry Show Open. a.m. and p.m.—Committee meetings and plant visits.
11:00 a.m.—Gray Iron Shop Course (Session 1)
1:00 p.m.—Special Group Plant Visit—Wisconsin Steel division, International Harvester Co., and Museum of Science and Industry.
7:00 p.m.—University Instructors' Dinner.
8:00 p.m.—Plant and Plant Equipment.

Tuesday, May 7

9:00 to 5:30 p.m.—Foundry Show Open.
9:00 a.m.—Sand Shop Course (Session 1).
10.00 a.m.—Apprentice Training.
10:00 a.m.—Malleable Cast Iron.
2:00 p.m.—Patternmaking.
2:00 p.m.—Nonferrous.
2:00 p.m.—Malleable.
4:00 p.m.—Gray Iron Shop Course (Session 2)
5:00 to 7:00 p.m.—Open House, Chicago Chapter.
8:00 p.m.—Refractories.
8:00 p.m.—Nonferrous.
8:00 p.m.—Crystallization Demonstration No. 1.

Wednesday, May 8

8:30 a.m.—Sand Shop Course (Session 2).
9:30 a.m. to 11:00 a.m.—Annual business Meeting and Board of Awards Lecture.
11:00 a.m. to 6:00 p.m.—Foundry Show Open.
12:30 p.m. — Nonferrous Division Round Table Luncheon.
12:30 p.m.—Malleable Division Round Table Luncheon.
2:00 p.m.—Foundry Costs.
2:00 p.m.—Sand Research.
4:00 p.m.—Gray Iron Shop Course (Session 3).
7:00 p.m.—Nonferrous Division Annual Dinner.
8:00 p.m.—Crystallization Demonstration No. 2.

Thursday, May 9

9:00 a.m. to 5:30 p.m.—Foundry Show Open.
9:00 a.m.—Sand Shop Course (Session 3).
10:00 a.m.—Foreman Training.
10:00 a.m.—Steel.
10:00 a.m.—Job Evaluation.
10:00 a.m.—Sand Research.
12:30 p.m. — Gray Iron Division Luncheon.
2:00 p.m.—Gray Iron.
2:00 p.m.—Steel.
2:00 p.m.—Safety & Hygiene.
4:00 p.m.—Gray Iron Shop Course (Session 4).
4:30 p.m.—Crystallization Demonstration No. 3.
7:00 p.m.—Annual Dinner.

Friday, May 10

9:00 a.m. to 3:30 p.m.—Foundry Show Open.
9:00 a.m.—Sand Shop Course (Session 4).
10:00 a.m.—Gray Iron.
10:00 a.m.—Steel.
12:30 p.m. — Steel Division Round Table Luncheon.
2:00 p.m.—Gray Iron.
3:30 p.m.—Foundry Show Closes.

AVOIDING DEFECTS *in the* Nonferrous FOUNDRY

By N. K. B. PATCH

CAUSES for defective nonferrous castings, and in many instances necessary preventative measures were outlined in recent issues of THE FOUNDRY. Obviously these remarks were general, and did not include detailed causes that applied to specific compositions. Certain causes for defects are general to all compositions and yet, even in many items, the composition of the material influences the amount of a given kind of defect to be expected from a given cause. However, certain compositions have their own peculiar type of defect. For example, scum spots are produced in many castings made from aluminum bronze or the silicon bronze alloys, or other compositions in which the presence of aluminum or silicon is in sufficient amounts to produce what is commonly known as the soapy effect.

Possibly it might be well to define at this point what many people mean by the soapy effect. To the author it means the foaming possibility of the alloy, similar to the foaming effect of soap in water. This foam is the material of which the scum is formed and the accumulation of this scum in spots is the defect that so often gives serious trouble. In the compositions containing aluminum or silicon, or both, these metals form an envelop just like the skin of a soap bubble. Inside that envelop is the metal itself, protected from further oxidation by the surrounding atmosphere. If the envelop is not broken but simply is expanded as the soap bubble is expanded when the bubble is blown, the metal within the envelop is clean and free from scum. When the casting is solidified, the surface of course is covered with a microscopically thin film which was this envelop.

One of the most prolific sources of the development of scum spots is the breaking of this envelop by pouring metal into the mold through gates or orifices that fracture the film, thus necessitating the formation of a new film to complete the envelop around the metal. Each time this film or envelop is broken, a new film immediately forms. Agitation of the metal causes this film either to be broken or at least gathered together in visible scum spots. In many instances the broken envelop is folded into the casting by the inrush of metal through improper gates. Folding gives the indication of a cold shut because the metal is not united. The film is not redissolved.

Where metal enters the mold as a jet or spray, formation of the oxide film over all of the different surfaces developed in this jet means an excessive development of scum. It means complete disruption of the protective envelop. It almost means sure rejection of castings because of scum spots, film inclusions, seams, etc., which may be present.

Correction for these problems is two-fold: The gating system must allow the metal to enter the mold quietly and steadily. Once a stream has entered the mold and the envelop over the metal has been formed, this envelop must be gradually expanded. Disruption must be avoided by provision of the right kind of gates to insure this steady, free flowing of the metal.

Pouring must be done without breaking the stream, without carrying air in with the metal, and without such force as to disrupt or break the film around the metal within the mold. Pouring must be done steadily at a uniform speed and force and in sufficient volume to insure the influx of plenty of metal into the mold to keep all pouring sprues full and cover all thin parts of the castings fast enough to avoid breaking the envelop where the temperature of these thin spots has fallen to a point where the metal is too cold to run freely. Pouring is quite an important factor in the production of good castings in these metals that have this soapy characteristic resulting from the presence of aluminum or silicon as elements of the alloy.

Lead Segregation Causes Rejection

High lead bronze compositions containing from 10 to 50 per cent lead have their own peculiar type of defects. Lead segregation is one of the notable defects that cause rejection. Sponginess is another example of a comment defect. Improper distribution of the lead through the casting is a typical defect of this series. These alloys are poured at relatively low temperatures if they are melted properly and are sufficiently free from oxides. Presence of an excess amount of lead oxide will cause these alloys to be very sluggish.

Natural tendency of the foundryman is to increase the pouring temperature in the hope of raising the fluidity to a point where he can pour the castings to his satisfaction. Obviously, with increase in pouring temperature the average temperature of the cast metal within the mold is raised. Consequently the time necessary for the casting to set is increased. If lead segregation is to occur the tendency is increased with any increase in temperature. Correction for an excess amount (*Please turn to page* 102)

Fundamentals of Core

DETAILS of core blowing practice, including the selection and installation of a core blower, sand mixtures for blowing, core box equipment and blow holes, were discussed in the February, 1940 issue of THE FOUNDRY. The following discussion pertains to what probably is the most important part of the entire rigging, namely the size, type and location of the vents.

Venting Core Boxes: In venting a core box for blowing purposes, it should be kept in mind that in principle and theory the core box cavity is filled by introducing sand into the core box, suspended in a stream of air under pressure. The purpose of the vents is to provide passage for the air back to atmosphere and at the same time prevent the passage of the sand grains, thus trapping the sand in the core box cavity and uniformly filling the core.

Enter Box at High Velocity

Since the sand and air are introduced into the box through relatively small apertures, (blow holes being from 3/16 to ¾-inch in diameter on the average), and under a blowing pressure of from 90 to 120 pounds, the stream of sand and air will enter the box at a high velocity. Upon passing through the restricted openings of the blow holes, there is an immediate expansive action of the blow stream to fill the space made available by the cavity in the core box.

This action approaches an explosive condition causing the sand grains to rebound from the point of contact with the inside walls of the core box and to exert a general whipping action. Upon being released to the low pressure of the core box cavity it is assumed that there is an initial drop in the velocity of the blow stream with the result that the sand grains find permanent rest. The core cavity fills first directly under the blow holes through which the sand is introduced. Then, as the core box fills and the available room for the passage of air becomes progressively less, the

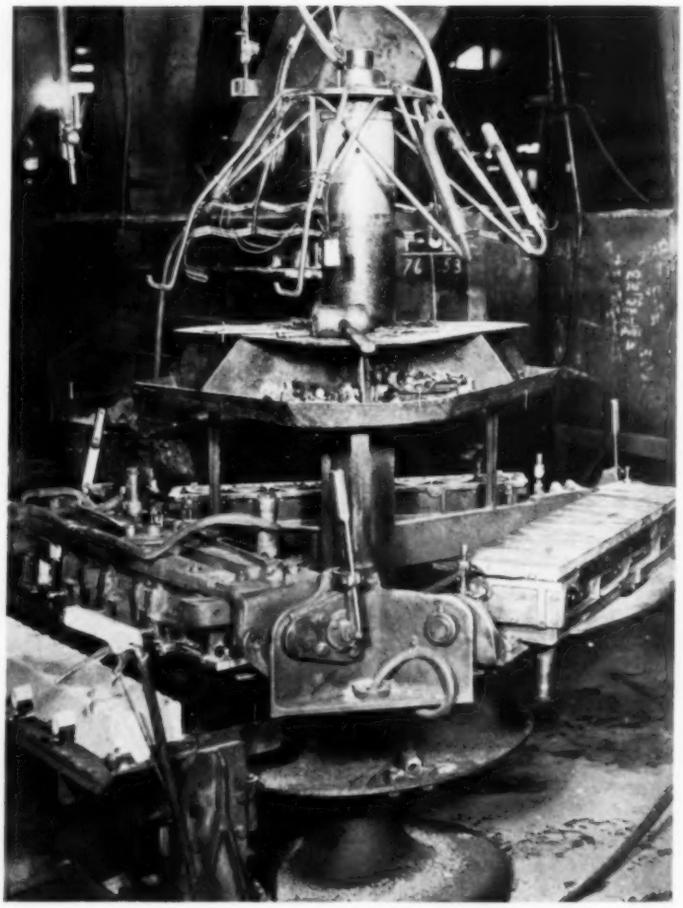
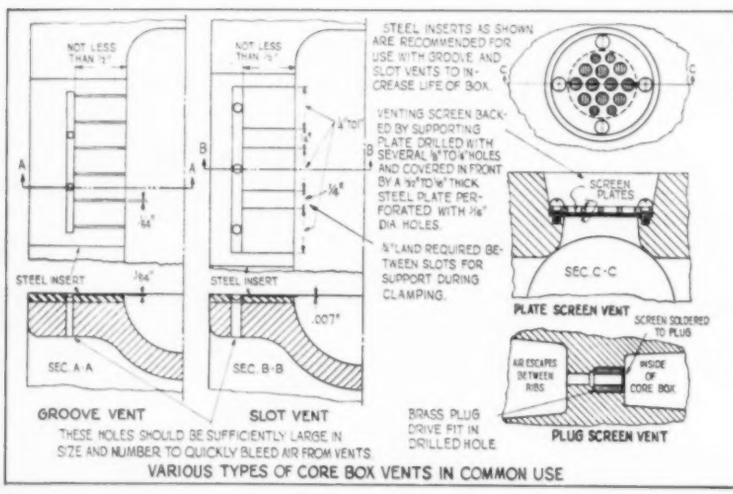
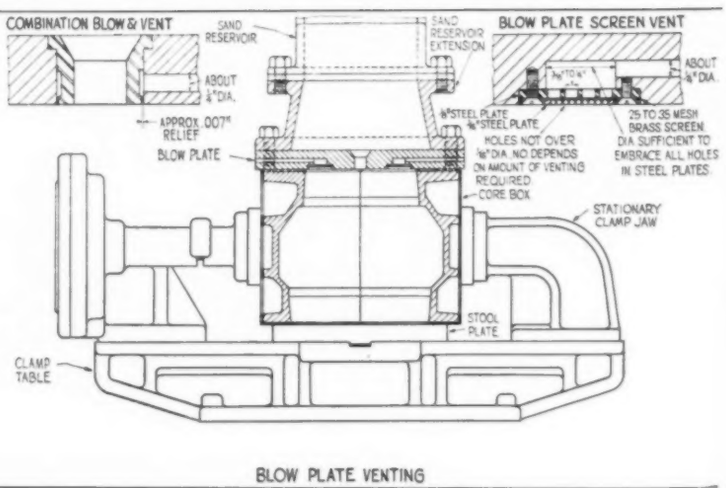


Fig. 6 (Left below)—In many cases one or more very small holes (about No. 10 drill) drilled through the box at the point where venting is required, is an entirely satisfactory means of venting. Fig. 7 (Right below)—Further details of venting. Fig. 8 (Right)—Installation view of core blower served by special turntable


NOT LESS THAN ¼"
STEEL INSERT
SEC. A-A
SEC. B-B
GROOVE VENT
SLOT VENT
.007"
THESE HOLES SHOULD BE SUFFICIENTLY LARGE IN SIZE AND NUMBER TO QUICKLY BLEED AIR FROM VENTS
STEEL INSERTS AS SHOWN ARE RECOMMENDED FOR USE WITH GROOVE AND SLOT VENTS TO INCREASE LIFE OF BOX.
VENTING SCREEN BACKED BY SUPPORTING PLATE DRILLED WITH SEVERAL ⅛" TO ¼" HOLES AND COVERED IN FRONT BY A 20" TO 16" THICK STEEL PLATE PERFORATED WITH 1/16" DIA. HOLES.
½" LAND REQUIRED BETWEEN SLOTS FOR SUPPORT DURING CLAMPING.
SCREEN PLATES
SEC. C-C
PLATE SCREEN VENT
SCREEN SOLDERED TO PLUG
AIR ESCAPES BETWEEN RIBS
INSIDE OF CORE BOX
BRASS PLUG DRIVE FIT IN DRILLED HOLE
PLUG SCREEN VENT

VARIOUS TYPES OF CORE BOX VENTS IN COMMON USE


COMBINATION BLOW & VENT
SAND RESERVOIR
SAND RESERVOIR EXTENSION
ABOUT ¼" DIA.
APPROX. .007" RELIEF
BLOW PLATE
BLOW PLATE SCREEN VENT
ABOUT ¼" DIA.
⅛" STEEL PLATE
¼" STEEL PLATE
25 TO 35 MESH BRASS SCREEN DIA SUFFICIENT TO EMBRACE ALL HOLES IN STEEL PLATES
HOLES NOT OVER ⅛" DIA. NO. DEPENDS ON AMOUNT OF VENTING REQUIRED
CORE BOX
STATIONARY CLAMP JAW
STOOL PLATE
CLAMP TABLE

BLOW PLATE VENTING

By R. F. LINCOLN
Sales Manager
Osborn Mfg. Co., Cleveland

Blowing

velocity of the blow stream increases in the attempt to return to the ultimate, with the sand grains tending to follow the direction of the air stream in which they are partially suspended. As the natural flow of the air stream is toward atmosphere through the vents, it is further assumed that those portions of the core farthest from the blow holes and immediately adjacent to the vents, fill last.

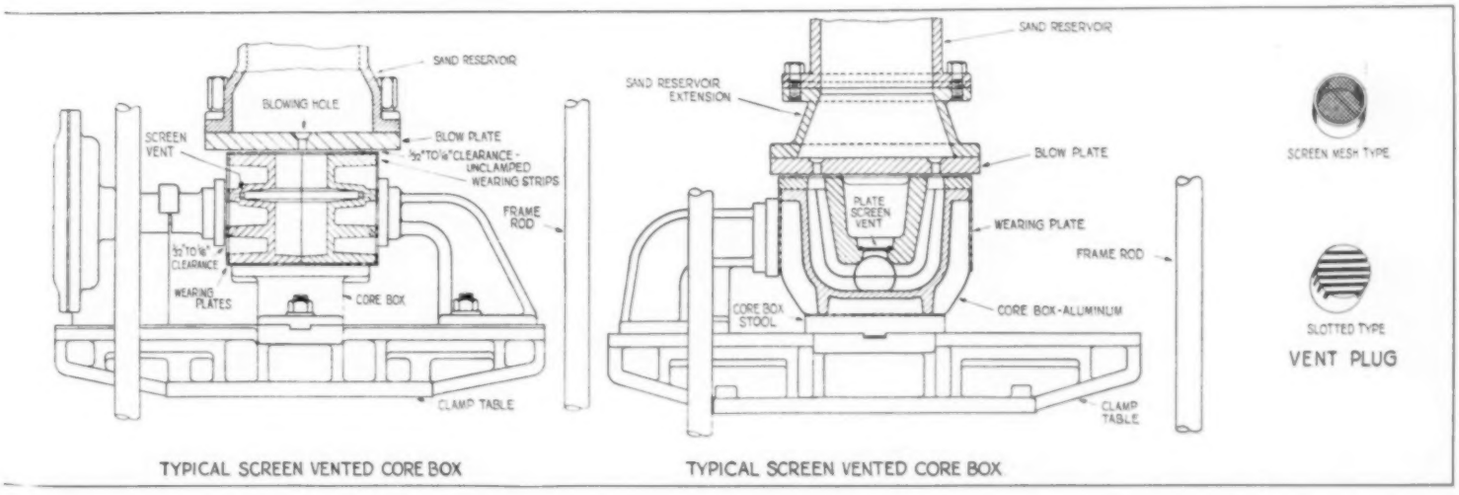
As the air itself is introduced into the core box cavity solely as a vehicle for conveying the sand, it is necessary that adequate provision be made for the air to escape as the box is filled by the trapped sand grains. Therefore, the combined venting area in the core box plus leakage should balance the combined area of the blow holes. Quite contrary to an otherwise perfectly natural conclusion, when cores come soft, or with soft spots on the shoulders or corners, it is due to lack of proper and sufficient vents rather than to lack of blowing pressure.

Vents Divert Air Stream

In venting any given job, advantage should be taken of the degree to which the core box will fill, due to the natural flow of sand from the blow holes. Also, the natural flow of sand in the box should be influenced by diverting the air stream to the desired parts of the core. This is accomplished by introducing vents in the core box at these points. As previously stated under the subject of blow holes, the sand flow resists abrupt changes in direction or around corners, and this also has a direct bearing on the location of vents.

Insofar as actual vents are concerned there are many different sizes, types, and combinations used to

Fig. 9 (Left below)—View of corebox on machine. Sand reservoir is in blowing position. Note use of screen vents in box. Rib box is for strength without excessive weight. Inside diameter of screen vents depends on amount of venting required. Length of vent plug need be no longer than necessary for a solid drive fit in core box. Screen size 28 to 35 mesh depending on sand grain size. Fig. 10 (Center below)—For unusually long or wide jobs, a sand reservoir extension should be used. There is no standard size; the extension being made to suit one or more jobs of similar size. Sand reservoir should be constructed sturdily, and cast iron may be used in most cases. Fig. 11 (Right below)—Types of vent plugs



accomplish the desired results. The ultimate purpose of a vent being to provide an outlet for the air and at the same time resist the passage of the sand, it sometimes is possible to blow small simple cores satisfactorily with no vents other than the natural leakage at the parting line of the core box or by a series of slight grooves cut into the box at the parting line. On the other hand, where the core is complicated and it is necessary to influence the flow of sand into pockets or toward shoulders and corners, a more elaborate venting arrangement is required. Various types of vents commonly used in combination to accomplish the desired results, are shown in Fig. 6. Figs. 7, 9, and 10 show further detail in the application of the several types of vents under different conditions.

Use Screen or Slot-Vents

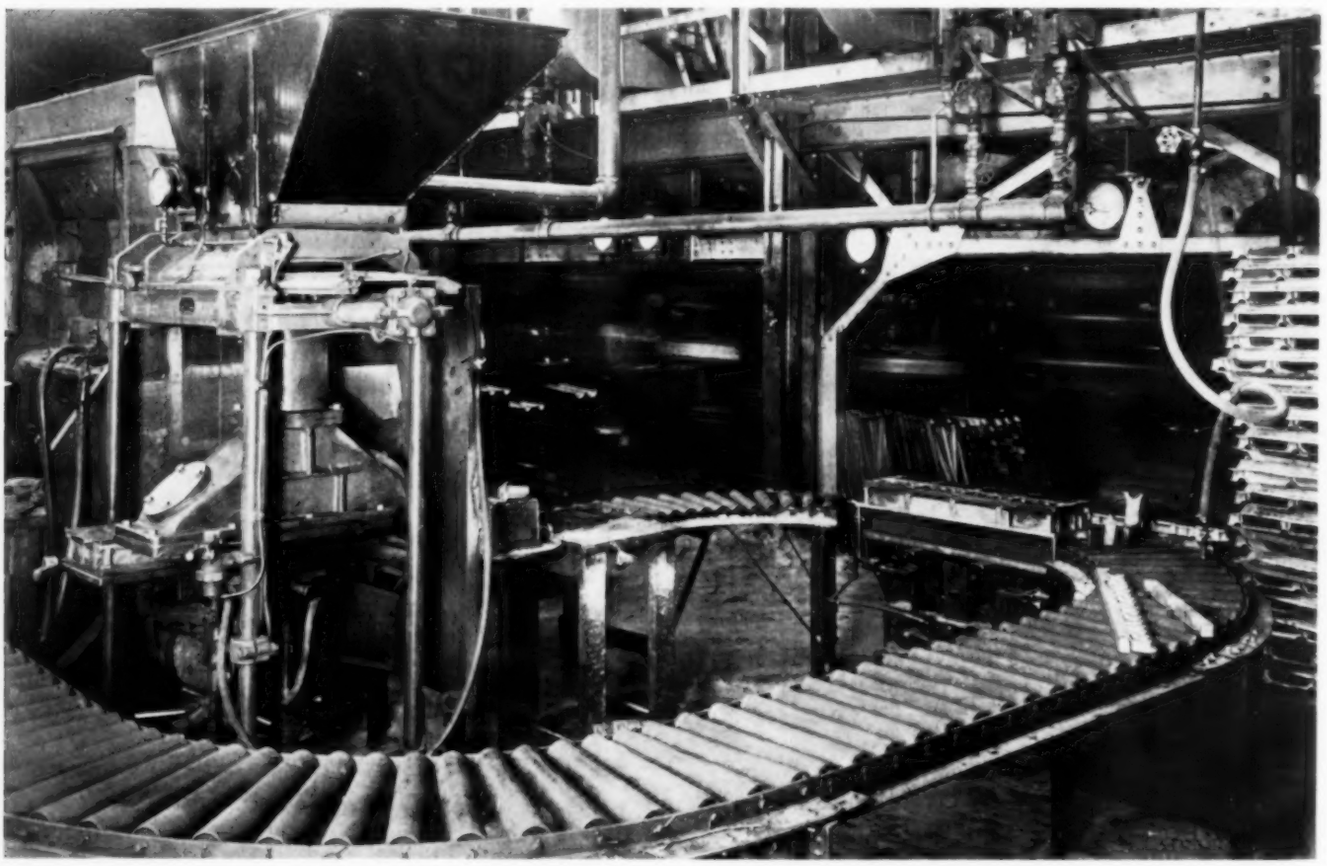
Vent plugs for use in venting core boxes for blowing purposes are available commercially, and are manufactured in a wide range of plug diameters from 3/16 to ¾-inch and in several different sizes of surface openings. The two best known types, shown in Fig. 11, are the screen mesh construction and the slotted construction each of which has individual merit under certain conditions. On intricate or difficult jobs where these commercial vents are not adequate, special treatment is required in the way of blow plate venting, combination blow and vent holes, etc. In all cases it is important that vents are provided with free exit to atmosphere, and that the core box is protected as far as possible from the cutting action of the sand particles suspended in the blow stream. This can be improved by the use of steel wearing plates where possible.

Where groove or slot vents are used on a parting line, these vents should be converged into a common outlet and not extended over the entire width of the core box land at the parting line, as shown in Fig. 6. Direct outlets from the core box cavity to atmosphere should be discouraged since the cutting action of the venting stream on the core box is reduced materially by at least one short and abrupt change in direction. This retards the velocity of the sand particles, which blow through the vents, without materially affecting the passage of the air and consequently reduces the cutting action on the box.

Cavity Is Filled Uniformly

Use of Nails, Wires and Rods: Due to the nature of a blowing operation, it is possible quickly and uniformly to fill core box cavities having unusual or intricate contours which would be difficult or impossible to ram by hand. The fact that the core box cavity is filled uniformly eliminates the hazard of hard and soft spots. Therefore, the core is of maximum strength and will not require reinforcing wires and rods to the extent necessary in a hand rammed core. However, these reinforcing mediums may be used where found necessary. Usually it is possible to design core boxes so that either they can be blown through a core print or so (*Please turn to page* 94)

Fig. 12—Core blower installed with gravity conveyor loop for production of automotive jacket cores



Modernizing YOUR FOUNDRY

BY ARTHUR J. TUSCANY
Tuscany-Turner & Associates
Executive Secretary-Treasurer,
Foundry Equipment Manufacturers Association
Cleveland

AT THE outset it is important to understand clearly just what we have in mind when using the phrase modernizing as applied to a foundry. One important phase of its meaning is the continual maintenance of the foundry to a point where it will produce most efficiently whatever type of casting is being made. Literally, modernization consists in building the plant and installing equipment around the product, not confining methods to limitations of the plant and equipment. That should be the first concrete definition.

At the same time foundry modernization cannot be limited by such a strictly mechanical definition. Probably a much more important part of modernizing lies in the industrial philosophy of the foundry management. Modernization of any foundry presupposes courage and competence on the part of management. Management must be alert and progressive in its thinking. It must be able to see eventual profit in any expense involved in developing better employe relations. It must be alert to business changes which will present new markets demanding new products. In short, management must be receptive to any and all new ideas.

Outstanding Attitude Toward Modernizing

It has been recognized for years that the attitude of the automobile industry toward the question of modernizing is outstanding. That industry's managerial thinking has been characterized indelibly, as Henry Ford very properly stated, by "an absence of fear of the future or veneration of the past." Such thinking has paid handsome dividends.

The definition of modernizing in a sense is double-jointed. The first portion has to do with developing the plant and equipment to the point best suited for the purpose intended. The second and probably much more important section consists of executive thinking and acting of a type which is a necessary accompaniment of the first portion, if a profitable foundry is to be maintained. These two points go hand in hand and always are present in the thinking and acting of a progressively operated foundry.

Now we come to a subject which I am quite certain has been in your mind in considering this entire question. You ask, "Am I to conclude that an unrestrained purchase of buildings and equipment is the answer to the foundryman's prayer for profit and prosperity?" By no manner of means! Rather, wise management based on experience of the gay 20's definitely will place new buildings as one of the last steps in the modernizing campaign.

First the progressive foundry executive should determine new and less costly ways of producing his present product. Mere buying of brick, mortar and machinery in itself is anything but modernization. Unless production costs are lowered, the quality of the product improved, or both, the true objective has been lost.

Confine Production To Specific Line

You have observed foundry organizations in the jobbing field which have gone along year after year with their share of the going volume, invariably showing a profit at the end of each year. A check-up of methods of those organizations usually will indicate they are confining production to a given line of products or certain related types of castings. They do not flit from one type of work to another. They have trained their organizations—another important phase of modernization—to do certain things well. They have not hesitated to add new equipment when investigation shows reduced costs and improved quality will result from such purchases.

Stated a little differently, modernization is an outstanding phase of alert and definite managerial planning. Modernization does not take place in spectacular moves. It is a constant process and often is confined to a department, a foundry wing or more frequently to a machine at a time.

Some executives engage in modernization much the same as certain individuals engage in exercise when the doctor's prescription calls for it. They will work out vigorously over a week end, and then refrain from any activity for days, forgetting that most satisfactory results come from the required amount of daily exercise. Modernizing done in that manner loses much of its value. (*Please turn to page* 100)

Questions and Answers

Shrink Defect in Chopper Is Caused by Extra Steam

We are forwarding a body casting for a small domestic type food chopper with either a shrinkage or blow hole in the end of the member by which the device is attached to a bench or table. The cavity occupies quite a space in the center, but the most peculiar feature is that the opening is on the drag side of the casting. We have been making these castings without any trouble for the past 2 years, but on two consecutive days recently the loss has been 40 per cent. There has been no change in molding or melting practice. The iron is poured through a single sprue and distributed through three small, thin gates, two on the body and one into the end which shows the defect. Gates are on the cope side of the mold.

General appearance of the cavity and the fact that the opening is on the drag side indicate that the defect was caused by a jet of steam. In the face of the statement that thousands of castings have been made satisfactorily and that no change was made in materials or methods it is rather a problem to decide what caused this jet of steam to appear and produce this form of defect. Obviously the sand in the vicinity of the defective area was too damp, but the reason it was too damp can be determined only by close observation of every step in the production of the mold. Some molders are notoriously careless in the use of a swab.

Several Methods Used To Build Bronze Tablet Patterns

We shall appreciate a description of methods and materials employed in the production of bronze tablet patterns. How is the background tooled, how are the letters attached and how is the mold finished to produce a clean, smooth casting?

As with many types of patterns, several methods are employed in the construction of patterns for bronze tablets. In many instances the choice of material and method is governed by the size of the pattern, while in other instances the choice is influenced by other factors, border, ornamental features, style and extent of letters, etc. Unfortunately you do not mention any of these particulars. Complete detailed illustrated descriptions of tablet pattern making and molding have been presented in THE FOUNDRY on many occasions. The most recent reference was in two articles published in the September, and October, 1934 issues. These formed a part of a series of five articles dealing with the use of plaster of paris as a pattern medium.

Other articles dealing principally with the foundry practice involved in the production of the casting appeared in the following issues of THE FOUNDRY: May 15, 1923; April 1, 1925; Oct. 1, 1928 and Sept. 15, 1929. Wood patterns for small tablets present no particular problem. On the larger patterns, stop-off brace strips are attached to the back to prevent the pattern from warping. Cavities left by these strips in the cope are filled with sand in the usual manner. In some cases small brads are employed to hold the letters in place on the face of the tablet pattern, but the almost universal custom is to attach them with shellac.

The castings are molded with the face in the drag. The face of the mold is sprayed with a thin mixture of blacking, molasses and water and then skin dried, either with a torch or a charcoal fire. Method of gating of course depends on the area of the tablet. For medium and large size tablets the most satisfactory method is to pour the metal through a number of small wedge gates spaced from 6 to 10 inches apart.

Malleable Iron Castings Show Cracks and Hot Tears

We are having difficulty with some of our malleable iron castings in that fine hair line cracks or hot tears extend into the metal from a few hundredths of an inch up to ¼-inch at times. The cracks occur always on the cope side in the vicinity or directly at the gate. No data are available on the dry strength of the sand but examination where it forms a green sand core indicates that it bakes extremely hard and is hard to remove. Metal is made by duplexing, and the composition of the white iron shows 2.3 per cent total carbon, 1.10 per cent silicon, 0.45 per cent manganese, 0.10 per cent sulphur, and 0.12 per cent phosphorus. Metal temperature at the spout is 2910 degrees Fahr., and pouring temperature is about 2800 degrees Fahr.

It probably is a correct but rather useless statement to say that cracks or tears such as you mention, always occur when and where a body of metal is trying to cool and hence contract, but is prevented from doing so by constraints arising either from the mold structure or from the casting's own design. The present case is probably no exception and one points to the occurrence of the defect near the gate as evidence of its appearance in a relatively hot portion of the casting which may be constrained by the cold and more rigid portions.

A solution of the problem perhaps might be ap-

proached better by a study on the plant's part of what operating conditions have been changed since the time when the cracks were absent rather than from the viewpoint of what the present conditions are. Quite simply, the temperature of the metal may be of importance as affecting changes of temperature distribution within the casting. The composition may be important as affecting the contraction of the metal or more probably affecting its strength when hot. Properties of the sand mold may be important as affecting the cooling rate of the casting or as affecting the mechanical strength of the sand structure which constrains the contraction of the casting. It would appear profitable for the plant to change, one at a time, those variables which may be suspected of producing the result and note what happens.

Very superficially carbon content, pouring temperature, and hot strength of the sand seem to be the most probable variables affecting the result. However, it is possible that much more obscure causes of variation exist which you have not noticed in your exhaustive enumeration of operating conditions. The fact that the difficulty occurs on all types of castings suggests that the fault lies in some condition which is uniform throughout. This may point either to a cause within the metal or to the sand if the sand is all prepared in one single unit. Experimentation would seem to be the only way for you to solve your problem.

Foreign Material Entrained in Metal Carried Into Mold

We are sending a valve casting with defects indicated with red pencil. We also are including a sketch of the gating method employed. We would like to know what the foreign substance is that accumulates between the core and the green sand wall just adjacent to the flange. Any suggestions as to methods of preventing that defect will be appreciated.

Careful examination of the fractured valve casting submitted for examination leads to the opinion that the difficulty is due to foreign material entrained in the molten metal and carried into the casting. Possibly the metal is not stirred sufficiently to bring all the suspended foreign materials to the top of the metal. Also the pot may not be skimmed carefully. It may be that you are employing some kind of a flux which results in a very thin slag which is difficult to remove. Try the addition of a little dry sand to thicken the slag so that it may be removed thoroughly from the surface of the molten metal.

While careful skimming and stirring cannot be overlooked, it may be well worth your while to try a strainer gate on the casting. As you know, the strainer gate employs a dry oil-sand disk perforated with a number of small holes which is placed between the sprue or down gate and the branch gate or runner leading to the casting. That type of gate is quite common in malleable and gray iron foundries, but is coming into greater use in numerous nonferrous foundries. Excellent results are claimed by those who have used it.

Make Abrasive Material Stick To the Face of Mold

In the manufacture of safety stair treads and disks for potato peeling machines, an abrasive such as carbide of silicon, alumina, or ground chrome is used. That material is applied to the surface of the green sand mold or dry sand core. Can you tell us what material is employed for holding the abrasive on the mold or core?

Abrasive materials used in the production of cast safety stair treads, potato peeler disks, etc., may be held in place on the mold surfaces by a number of materials including thin clay wash, molasses water, and sodium silicate solution although the latter is probably the principal one in use. Those are sprayed on the mold face, and the abrasive is applied through a screen or sieve of the proper size. Only a thin layer is put in position, and then the face is sprayed again for the second abrasive coat. With a green sand mold the face is dried thoroughly with a torch before the molten metal is poured in. With dry sand, the mold is dried in the oven again.

Suggests How To Prepare the Bottom of Foundry Cupola

We are melting 90 tons per day, or approximately 11 tons per hour in a cupola lined to 60 inches and slagged through the spout. Do you know of any special precautions required in preparing the bottom on cupolas running all day heats? What are the characteristics of the sand, the thickness and any other pertinent factors?

For all practical purposes there is little or no difference between the preparation of the sand bed in a cupola for short or long heats. In the original installation ordinary molding sand is employed, but thereafter day by day the sand in the drop is reclaimed, riddled and used over again. Inevitably some is lost and the discrepancy is made up with old sand from one of the heaps or from the dump. Occasionally a little new sand is added to provide a bond, but old sand with all organic material burned out is more permeable than new sand and forms a better bed for the molten iron. The sand is moistened with water to the usual workability of molding sand, or a little less, approximately 4 per cent. Wet sand or sand that is rammed too hard will cause the iron to boil and lose temperature. If too wet, the boiling action may disrupt the bottom and allow the iron to leak through.

After the cupola is daubed, one of the half bottom doors is propped in place and the anticipated amount of sand is shoveled on to it. Then the second half door is raised and propped in position. The cupola man descends from the charging door on a ladder and spreads the sand evenly over both half doors with a slant of ½-inch to the foot leading toward the tap-hole. If he needs additional sand it is carried up to the charging deck and thrown in through the charging door. For a 60-inch cupola the usual sand bottom thickness is 4 inches in front and 6 inches at the back.

Zinc Casting Lacks Smooth Face

We are having difficulty in casting zinc forming dies for stamping aircraft sheet metal work. We make these dies from brass special slab zinc and pour at 800 degrees Fahr. Castings range in size from 50 to 500 pounds and are molded in green sand using Albany sand of medium fineness. Bottom pouring is used in open sand without a cope. Castings are rough and necessitate considerable labor to finish. We also occasionally find a shrink from the bottom face of the die. All dies are about four inches thick. Will change in the metal take care of the shrinkage? Do you think drying will produce smooth die faces or if chilling the sides will help?

Since information on production of zinc castings is scarce we can only offer suggestions which may improve your results. The fact that your castings are rough, necessitating considerable finishing labor indicates that your sand is too coarse. That statement assumes of course that the sand is not too wet or rammed too hard which would cause blow holes. Our suggestion would be to obtain some fine Albany sand, say No. 0 or 00 and use just a thin layer of that sand before facing. The fine sand will result in an extremely smooth face on the casting.

Previously, wet sand and hard ramming were mentioned, and it is quite possible that your trouble arises from either or both of those. Those conditions will cause a boiling action when the molten metal strikes the sand which chews up the mold face and spoils the casting. Since we do not have a specimen casting to examine, it is difficult for us to diagnose the trouble correctly. Possibly, if you were to skin dry the mold face, using your present sand, you may eliminate the trouble if it is due to wet sand. Another suggestion to obtain a smooth face is to give it a coat of blacking or plumbago which is slicked on carefully. You mention a shrink from the bottom face of the die which hardly seems possible to us because a shrink usually occurs in the upper part of the casting. Melting point of zinc is about 787 degrees Fahr. and according to what little information we can find, it should be poured as near as possible to that point. Consequently, we believe that your pouring temperature of 800 degrees Fahr. is satisfactory since you do not mention cold shuts and the mold not filling rapidly, etc. We do not believe that the use of chills on the four sides would be of much benefit, and might cause trouble if the chills were not kept perfectly clean. Use of an all chill mold would insure a smooth face, but would be expensive unless an extremely large number of castings were to be made from such a mold.

Strip Plate Rim to Prevent Cracking

We are going to make a circular cast iron plate 11 feet 6 inches diameter, ⅝-inch thickness of metal with the exception of the rim 5 inches wide and 2 inches thick. The plate is flat on the drag side and is reinforced on the back or cope side by eight radial ribs 3 inches high and ⅝-inch thick. The plate has an opening in the center 28 inches diameter and two smaller oval openings, 9 x 14 inches located between two pairs of opposite ribs. The mold was made in a wood flask with three rails under the drag for clamping and with steel bars in the cope all welded together. The casting was poured through a number of ⅜-inch pop gates supplied with metal from a four-way runner extending the full width and length of the cope. A large sprue in the center delivered metal to a large number of flat gates cut in the joint in the center. We also poured iron at the four corners from 200-pound ladles. The iron mixture was 60 per cent machinery scrap and 40 per cent pig containing silicon 3.00 per cent, phosphorus 0.38 per cent and manganese 0.75 per cent. The first casting cracked. Assuming that we can increase the thickness of the plate to ⅞-inch and core out the rim, do you think that will prevent the casting from cracking.

If the plate has an opportunity to contract normally it should not crack even with the discrepancy in thickness between the web and the rim. We are inclined to the opinion that the ridge projecting above the rim prevents normal contraction. You probably keep the mold tightly clamped until the casting cools to prevent warpage. A thicker plate and a cored channel in the thick rim would present a more desirable casting from a foundry viewpoint, but the present design is not an impossibility. Mold it with the flat face in the cope and with the outside rim and ribs in the drag.

The cope then can be lifted without disturbing the casting shortly after the casting is poured. All the sand in the cope can be shaken out on the face of the casting and the rim can be stripped to hasten the cooling of this part. We do not favor a sprue and branch gates in the opening in the center. There is a tremendous *lift* against the cope face and this lift is increased by a mass of gates in the center. Ordinary steel rails under the bottom and across the top are not sufficiently rigid to resist this lift.

The entire cope and the rails will spring a little in the center. If heavy I-beams are not available, the center of the rails should be weighted. Under a normal 12-inch cope head the lift or pressure against the cope on this plate is approximately 23 tons. Auxiliary gates on the rim are unnecessary and undesirable since they introduce hot metal in an area where the object should be to provide cooler metal than in the center. A circular runner basin about 5 feet in diameter with a channel leading to one side of the flask, and with eight ¼ x 4-inch gates will distribute the metal satisfactorily.

Materials Used for Follow Boards

We shall appreciate information on making hard sand matches for small malleable iron patterns on vibrator frames. What materials are used and in what proportion?

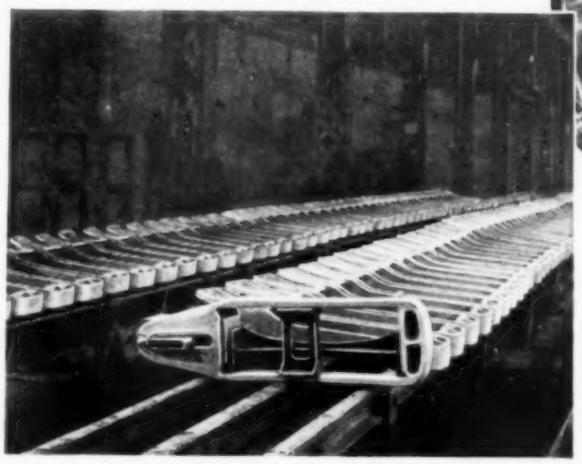
Hard sand matches, also known as follow boards, are made from a mixture of fine sand, linseed oil and litharge. The sand may be old or new. In some instances a considerable amount of sand dust is incorporated in the mixture. Formerly this dust was taken from under the tumbling barrels. Under modern conditions it is availabie in the dust recovery devices. In stove plate foundries where the facing sand is ground to a greater fineness, some of this material is employed in making the sand matches. In every case the thoroughly dried material is mixed with a sufficient amount of linseed oil to render it workable.

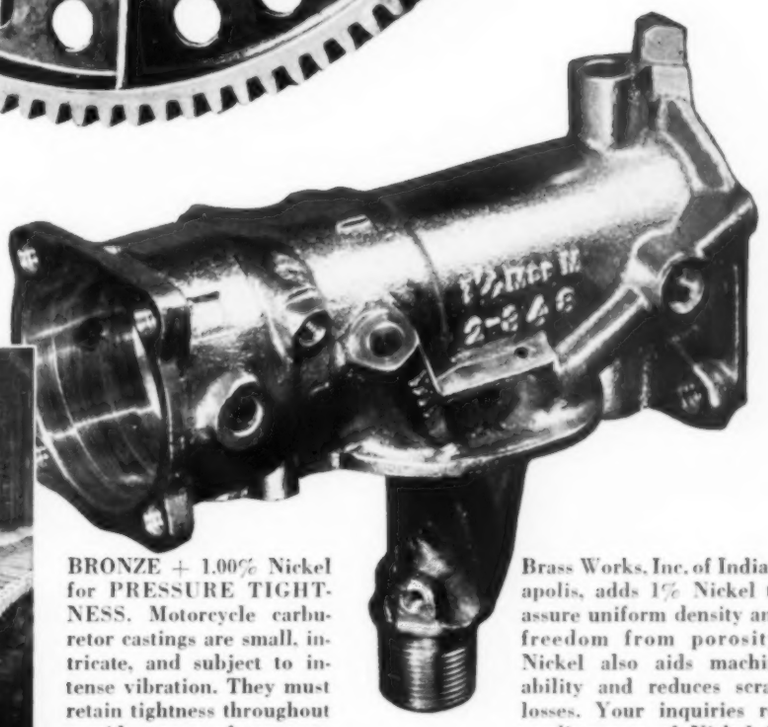
A handful of litharge is added to the small batch usually required for an ordinary snap flask match. Pattern matches or follow boards also are made from a number of other materials. Method of making fire clay follow boards was described and illustrated in an article in the June, 1933 issue of THE FOUNDRY. The advertising section of THE FOUNDRY presents names and addresses of several firms who supply match making material. One variety of this material resembles sand and is shipped in bags. It is rammed in the frame and around the patterns in the usual manner. The finished match is set aside for a few hours when it becomes air dried and hard. The manufacturer also is in position to supply the special frames. In a second variety the material is supplied as a powder. This powder is mixed with water to the consistency of thick clay wash and then poured into a prepared sand mold. It is claimed that it will solidify and be ready for use in less than an hour.

So little NICKEL makes these BIG IMPROVEMENTS

CAST IRON + 2.00% Nickel for INCREASED TOUGHNESS. 12-foot barking drum gears used in pulp and paper mills are subjected to wear and severe stresses. The Carthage Foundry & Machine Co., Carthage, N. Y., casts both gears and pinions from a Nickel alloyed iron of high machinable hardness and increased strength and toughness. With a 50% steel mixture the composition used for these gears is: T.C. 3.20%, Si 1.20%, Mn 0.90%, Ni 2.00%, and Cr 0.35%.

CAST STEEL + 1.25% Nickel for STRENGTH. Dead weight has long been a problem in the design of railroad rolling stock—particularly freight cars. To cut down excess weight and still secure sufficiently high strength and toughness to resist stresses to which freight car trucks are subjected in service, the Buckeye Steel Castings Co., Columbus, Ohio, cast these yokes, as well as side frames and bolsters, of a Nickel-manganese steel. Tests showed a tensile strength of 95,000 p.s.i. The composition is: C 0.28%, Mn 1.50%, Ni 1.25%, and Si 0.35%.





BRONZE + 1.00% Nickel for PRESSURE TIGHTNESS. Motorcycle carburetor castings are small, intricate, and subject to intense vibration. They must retain tightness throughout a wide range of temperatures. To the regular 85-5-5-5 bronze mixture Langenskamp, Wheeler Brass Works, Inc. of Indianapolis, adds 1% Nickel to assure uniform density and freedom from porosity. Nickel also aids machinability and reduces scrap losses. Your inquiries regarding uses of Nickel in irons, steels and non-ferrous alloys are always welcome.

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL ST., NEW YORK, N. Y.

MEN of INDUSTRY

PAUL S. LANE recently resigned as research metallurgist, American Hammered Piston Ring division, Koppers Co., Baltimore, to accept a position as research engineer with the Muskegon Piston Ring Co., Muskegon, Mich. Mr. Lane was graduated from Baltimore Polytechnic institute in 1922, but continued his engineering studies at the night schools of Johns Hopkins university. After spending several months in civil engineering work and surveying, he entered the employ of the Bartlett-Hayward Co., Baltimore, now the Koppers Co., as chemist. Later he served as metallurgist and assistant foundry superintendent. In 1931 he was made chief metallurgist and in 1936 he was made metallurgical research engineer. Mr. Lane has been active in the A.F.A., the Society of Automotive Engineers, and the American Society for Metals, and was general chairman of the committee which staged the Baltimore-Washington regional foundry conference in Baltimore last Fall.

♦ ♦ ♦

FRED E. HAKER, employed 40 years ago as a stenographer for the Allis-Chalmers Mfg. Co., Milwaukee, recently has been appointed general manager of purchases.

♦ ♦ ♦

FRIEDERICK BIRSCHEL JR., Gasper Campos, 1550, Vicente Lopez, Argentina, has been appointed representative in South America of the American Foundry Equipment Co., Mishawaka, Ind.

♦ ♦ ♦

E. C. HOENICKE, Eaton-Erb Foundry division, Eaton Mfg. Co., Detroit, addressed the Baltimore chapter of the S.A.E., Feb. 8, on "Permanent Mold Castings." Foundrymen in the Baltimore district were guests at the meeting.

♦ ♦ ♦

G. D. KLEMME, president, Eagle Foundry Co., Belleville, Ill., recently celebrated completion of 57 years' service with that organization. He is the only survivor of a group of foundrymen who organized the company in January, 1883

♦ ♦ ♦

HOWARD WILDER, formerly assistant superintendent, Nelson Bros. Co., Saginaw, Mich., has accepted a position with the Detroit Stoker Co., Monroe, Mich., in connection with the foundry department of that company.

♦ ♦ ♦

C. H. MCGRATH, formerly general purchasing agent, American Brake Shoe & Foundry Co., New York, has been appointed assistant to the president. W. T. KELLY JR., formerly assistant to the general purchasing agent, succeeds Mr. McGrath as general purchasing agent.

♦ ♦ ♦

GEORGE ENGER, formerly assistant treasurer, Fremont Foundry, Co., Fremont, O., has been elected treasurer, and HARRY G. KRAUS, Cleveland Trust Co., Cleveland, has been elected a director, filling the place vacated by the death of Alfred J. Kroenke.

♦ ♦ ♦

W. C. TRANSUE, purchasing agent, Ohio Cultivator Co., Bellevue, O., recently was elected councilman at large of Bellevue. At the same time J. CHAMPION, foundry superintendent of that company, was elected councilman from the ward in which he resides.

♦ ♦ ♦

JOHN O. OSTERGREN, vice president and general manager, Lakey Foundry & Machine Co., Muskegon, Mich., recently has been elected president and general manager, succeeding HERMAN A. BECKER, president of the company since 1918. Mr. Becker continues as a director of the company.

♦ ♦ ♦

WILLIAM GREENBAUM, president, Acme Foundry Co., Cleveland, recently celebrated the fortieth anniversary of the founding of the firm and the fiftieth anniversary of his connection with the foundry industry with an executive staff dinner and theatre party, Previous to his founding of the Acme company, Mr. Greenbaum was connected with the Cleveland Foundry Co., now the Perfection Stove Co.

♦ ♦ ♦

R. E. BROZO recently was made vice president, Detroit Sheet Metal Works, Detroit. Mr. Brozo is a graduate in engineering and for the past 17 years has followed the industrial field. In 1918 he became chief engineer of the Detroit Sheet Metal Works and held that position until December, 1937 when he was made vice president and chief engineer, Foundry Equipment Co., Cleveland. In January, 1940, he returned to the Detroit Sheet Metal Works as vice president.

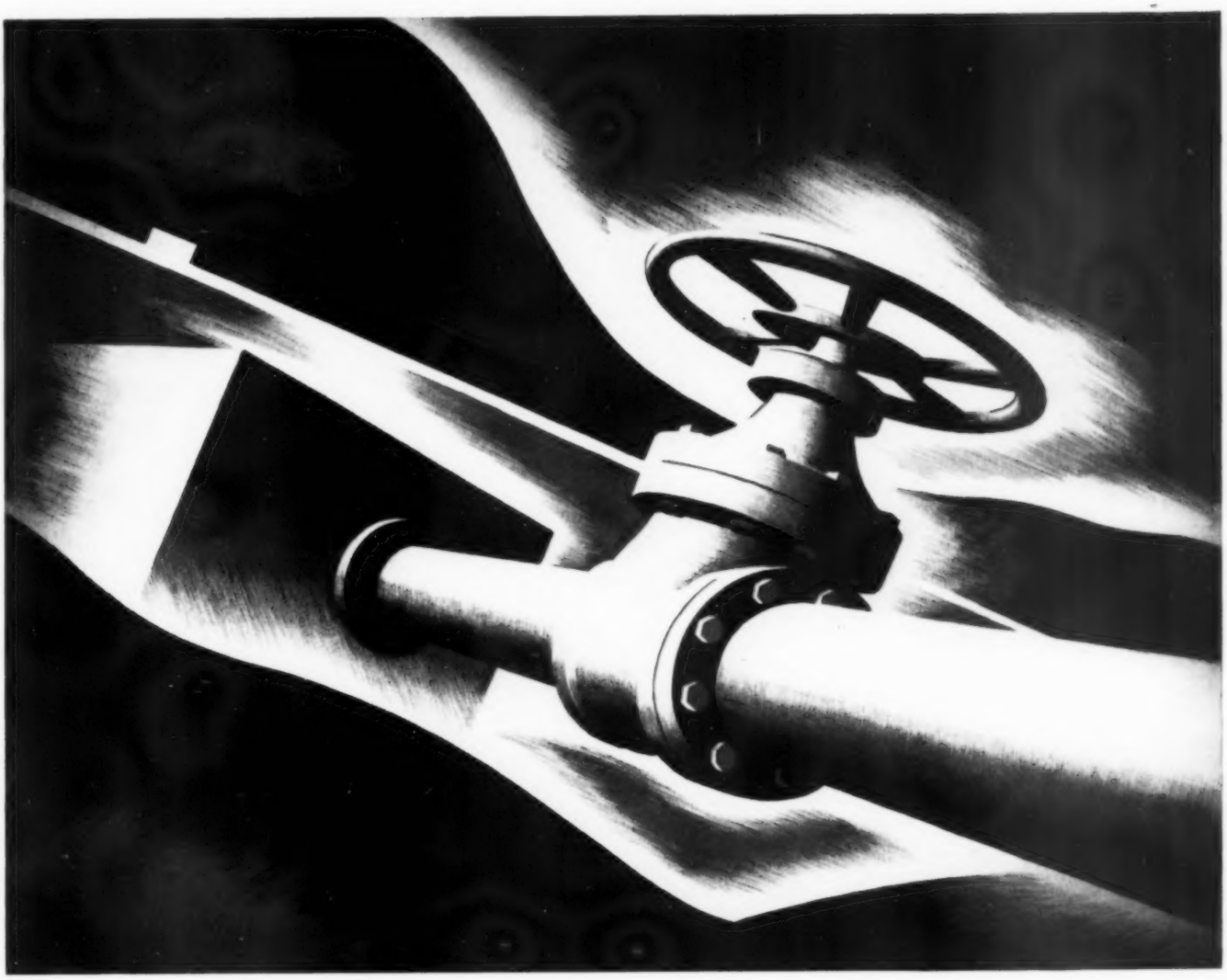
♦ ♦ ♦

JOHN W. LOHNES, formerly assistant to the general manager of sales, Vanadium Corp. of America, New York, recently was appointed assistant general manager of sales. DONALD C. HOSTETTLER, Eastern sales representative, has been transferred to the Detroit district sales office as sales representative, succeeding J. BERENS WATERS, who has been appointed general purchasing agent. JOHN B. GIRDLER has been appointed Eastern sales representative succeeding Mr. Hostettler.

♦ ♦ ♦

C. QUINTON SMITH recently has become associated with the foundry division, E. I. duPont de Nemours Co., Wilmington, Del. as assistant foundry supervisor. After graduation from the Pennsylvania State college, State College, Pa., in 1932, Mr. Smith did research work at the Baltimore Copper Works and was later connected with the Chambersburg Engineering Co., Chambersburg, Pa. as assistant foundry superintendent and metallurgist. Before accepting his present position, he was connected with the Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., serving first in the

(*Concluded on page* 44)



CONDITIONS, TOUGH . . . SOLUTION, EASY

Crude oil pipe-line service imposes severe requirements on the valves, particularly those used at pumping stations, river crossings and other points to permit sectionalizing of the line. Working pressures are high. Continual expansion and contraction of long pipe lines put heavy loads on the valve flanges.

These severe conditions have been met with entire satisfaction by 10" valves made of Molybdenum cast iron (0.50% Mo). The iron is noteworthy for the uniformity of structure and properties when cast in heavy sections. It makes valves that test pressure tight at double the working pressure of 800 pounds. Tensile strength is 48,000 p.s.i.

You may well be able to apply this iron or one of the other Molybdenum irons to advantage. Our technical book, "Molybdenum in Cast Iron", giving full practical data, will be sent free on request to interested engineers and production executives.

PRODUCERS OF MOLYBDENUM BRIQUETTES, FERRO-MOLYBDENUM, AND CALCIUM MOLYBDATE

Climax Mo-lyb-den-um Company
500 Fifth Avenue · New York City

MOLY

(*Concluded from page 42*)
Birdsboro plant and later in the newly equipped Reading plant of the company located at Reading, Pa.

• • •

OSCAR M. HAVEKOTTE, Pittsburgh, recently has been elected president and general manager, International-Stacey Corp., Columbus, O. Mr. Havekotte has been a director and a member of the executive committee of the corporation for the past 8 years.

• • •

R. K. HAUGHTON, formerly resident manager, United States Pipe & Foundry Co., Birmingham, Ala., has been made works manager of the company with offices in Burlington, N. J. J. S. BRIDGES, formerly superintendent at Birmingham, has been appointed acting resident manager of the plant, succeeding Mr. Haughton. Mr. Bridges has been active in the work of the Birmingham Chapter of the A.F.A. and was one of the first members of the board of directors of that organization.

• • •

W. H. MELANEY, sales manager, National Roll & Foundry Co., Avonmore, Pa., has retired after 60 years in the steel industry. Mr. Melaney, widely known throughout the operating end of the steel foundry industry, began his career as a roll turner at Portsmouth with the Phoenix Roll Works in 1880 and subsequently was employed by the former George A. Hogg Co., Pittsburgh. He had been with the National Roll & Foundry Co. for the past 25 years. Mr. Melaney is the author of a treatise on the subject, "Modern Sheet Mill Practice with Logic of Roll Design."

• • •

LASZLO TURSER, director, L. Lang Machine Mfg. Co. Ltd., and president of the foundry section of the National Association of Hungarian Ironworks and Machine Factories, recently was elected president of the Hungarian Foundrymen's association. FRITZ ALTENSTEIN, former president, was elected honorary member of the association. FERENC STROMFIELD, managing director of the National Association of Hungarian Ironworks and Machine Factories, and KALMAN DE KERPELY, inspector general of mining departments, Ganz & Co., Ltd., were elected vice presidents and ROBERT ERDOS was re-elected secretary of the association.

• • •

RUSSELL G. FORD, formerly buyer, recently was made general purchasing agent for the central office, Chevrolet Motors division. Mr. Ford is a native of Detroit and joined the Chevrolet organization in 1922 in the central office standards department. In 1928 he was named buyer for the purchasing department and when the division opened its commercial car body plant in Indianapolis, he was transferred there to serve as purchasing agent. In 1934 he returned to the central office purchasing department. HOWARD DINGLER has been made assistant general purchasing agent, JAMES CARNEY, material supervisor and WILLIAM WILSON, assistant material supervisor.

• • •

PAUL R. RAMP recently resigned from the York Foundry & Machine Co., York, Pa., to accept the position of foundry superintendent with the Youngstown Foundry & Machine Co., Youngstown, O. Mr. Ramp is descended from a long line of foundrymen who practiced the trade first in England and later in the United States. His grandfather was prominent in foundry circles in New York and his father carried on the tradition in the Middle West. Born in Youngstown, O., Mr. Ramp learned the molding trade under his father in Burlington, Ia. At the age of 21 he secured his first foreman's job and has had charge of many prominent foundries as manager or superintendent since that time. He always has been interested in teaching apprentices and has been a frequent contributor to the technical press on various problems associated with the foundry industry.

• • •

FRANK T. SISCO, editor, *Alloys of Iron Research*, of the Engineering Foundation, New York, has been elected chairman, Iron and Steel division, American Institute of Mining and Metallurgical Engineers for 1940. EDMUND M. WISE, staff adviser, research laboratories, International Nickel Co. Inc., Bayonne, N. J., has been elected chairman, Institute of Metals division. Mr. Sisco began his career in the steel industry in 1913 as chemist for Illinois Steel Co., South Chicago, Ill., serving successively as chief chemist, metallurgist, and engineer of tests for a number of large steel corporations. In 1923 he became metallurgist and chief of metallurgical laboratories, United States army air corps, Dayton, O., continuing in that capacity until he became editor of *Alloys of Iron Research* in 1930. Mr. Wise has been associated with International Nickel Co. since 1927 and prior to that connection was affiliated with General Electric Co., Schenectady, N. Y., and also with the Wadsworth Watch Case Co., Dayton, Ky.

Committee Nominate A.F.A. Officers

The nominating committee of the American Foundrymen's association recently met in Chicago and nominated the following:

President for 1 year, Lester N. Shannon, vice president and works manager, Stockman Pipe Fittings Co., Birmingham, Ala., and vice president of the association.

Vice president for 1 year, Herbert S. Simpson, president, National Engineering Co., Chicago, and a past director of the association.

Directors for 3-year terms, Henry S. Washburn, president, Plainville Casting Co., Plainville, Conn.; George W. Cannon, vice president, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich.; Leroy P. Robinson, sales manager, Werner G. Smith Co., Cleveland; Harold J. Roast, vice president, Canadian Bronze Co., Montreal, Que., Canada; B. D. Claffey, manager, gray iron division, General Malleable Corp., Waukesha, Wis.

The election will be held at the annual business meeting of the association held during the convention in Chicago, May 6 to 10, 1940. The following members of the nominating committee were present at the Chicago meeting: James L. Wick Jr., Falcon Bronze Co., Youngstown, O., chairman; Marshall Post, Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.; Hyman Bornstein, Deere & Co., Moline, Ill.; R. F. Harrington, Hunt-Spiller Mfg. Corp., Boston; J. W. Kelin, Federated Metals division, American Smelting & Refining Corp., St. Louis; Carl F. Joseph, Saginaw Malleable Iron division, General Motors Corp., Saginaw, Mich.; W. H. Parker, American Steel Foundries, East Chicago, Ind.

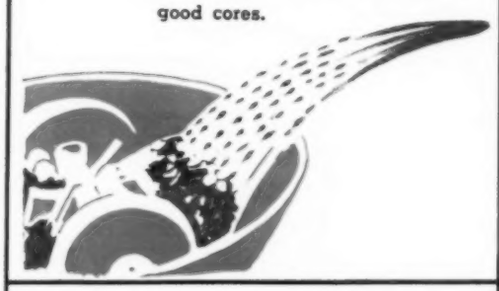
A.S.T.M. Will Meet In Detroit

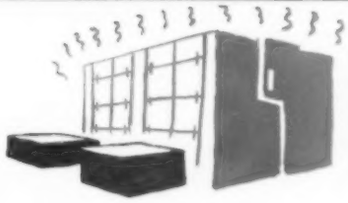
Regular spring meeting of the American Society for Testing Materials will be held in Detroit, March 6, at the Hotel Statler. The meeting will be devoted to a symposium on new materials in transportation consisting of 6 papers on exhaust valve materials for internal combustion engines, selection and application of automotive steels, concrete in transportation, rubber, volatile liquid fuel, and developments in lubrication. Forty-third annual meeting of the society will be held at Atlantic City, N. J., on June 24 to 28 at Chalfonte-Haddon hall.

Fortieth convention of the International Acetylene association is to be held in Milwaukee on April 10, 11 and 12. Convention headquarters will be at the Schroeder hotel.

Private Life of a Grain of Sand

1. Here's where I mix it up with that good low-cost Truline Binder, and turn out some really good cores.

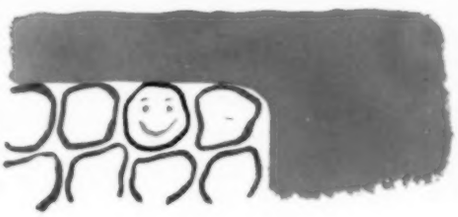




2. These Truline cores bake in almost nothing flat, so the boss saves on overtime. And was the core-maker happy when we rammed so nice and tight!

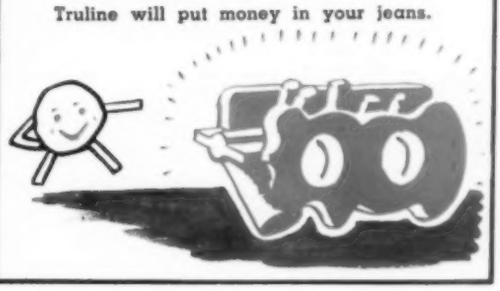
3. O. K., boss. We're strong and dry and plenty tough. Pour in the hot metal, and watch us take it without cutting.

4. Here she comes! Boy, see that Truline hold on till the metal is in; then watch it burn out like a match in a gale.



5. Wow! I'll say it burns away clean in the nick of time. Let that casting shrink; we're free to get out of its way.

6. What a casting! Sound, smooth, easy to clean, and not one shrinkage crack. Boss, you've got the right idea . . . Truline will put money in your jeans.



TRULINE BINDER

Reg. U. S. Pat. Off. by Hercules Powder Company

CAN BE USED WHEREVER METALS ARE CAST

HERCULES NAVAL STORES

HERCULES POWDER COMPANY

Incorporated

999 Market Street, Wilmington, Delaware

BRANCH OFFICES: Chicago New York St. Louis San Francisco Salt Lake City JJ-28

Yes, this sand grain has the right idea. Truline Binder saves money on good strong cores that turn out sound, smooth castings. Whether it's malleable or gray iron, steel or non-ferrous castings, low-cost Truline Binder will save you money . . . as a binder and in core-wash as well. A trial will convince you. Write today.

FOUNDRY DEVELOPMENTS AT SHORT RANGE

SATIN finish on aluminum castings may be obtained by polishing first with set-up wheels faced with No. 60 to No. 120 emery followed by No. 180 emery. Buffing tallow is used with the coarser abrasive while a greaseless polishing medium is employed with No. 180 abrasive. Following polishing with No. 180 emery the surfaces are buffed with muslin or felt wheels using grade *N* greaseless polishing compound. Other grades of greaseless compounds give coarser or finer finish depending upon grain size of the abrasive contained. A very fine satin finish may be obtained by using a rotary fiber brush or rubbing by hand with a paste made of pumice and oil.

* * *

Addition of a small amount of silver from 0.25 to 0.30 per cent to the 18 per cent chromium-8 per cent nickel stainless steel is said to reduce in a large degree the susceptibility to pitting from salt and saline solutions. The additions also are claimed to decrease work-hardening tendencies and improve machining characteristics. The new stainless steel is said to be particularly applicable in textile dyeing equipment as it shows a high resistance to corrosion from dyes.

* * *

An alloy composition for cast iron pots used in melting zinc-aluminum alloys, which is said to give excellent service, contains 1.6 per cent silicon, 0.6 per cent manganese, 3.4 per cent carbon, 2.2 per cent nickel and 1.1 per cent chromium. One pot of that composition has given 5 months of continuous service.

* * *

A reddish yellow alloy for air, gas and water fittings with which foundry practice is not difficult, and which machines well, contains 83 per cent copper, 4 per cent tin, 6 per cent lead, 7 per cent zinc, and 0.03 per cent phosphorus maximum. Tensile strength of the alloy ranges from 29,000 to 35,000 pounds per square inch, elongation in 2 inches from 25 to 35 per cent, reduction in area from 20 to 30 per cent, and brinell hardness from 40 to 50.

* * *

An investigation on effect of aluminum on cracking of steel castings under conditions of unrestrained contraction led to the opinion that the defect is not cracking but rather a shrinkage cavity which, due to its elongated form and proximity to the surface, gives the appearance of a crack. Hot pouring aggravated the condition, and application of risers eliminated the defect. Further work employing restrained contraction is contemplated to see if more light can be thrown upon the subject.

* * *

GATING and pouring temperature of gray iron are related intimately. A gate may appear too small if the metal is poured cold whereas a slightly higher pouring temperature would fill the mold properly. Conversely, a gate which seems too large with extremely hot iron, may be quite satisfactory with iron of a lower pouring temperature.

* * *

Automatic pouring is employed by one of the large auto makers in producing transmission housings. Molten metal from a 15-ton holding furnace automatically is tapped in definite amounts into refractory bowls or ladles mounted around the periphery of a rotating table, and these move around until one meets a mold coming into position on the conveyor line. A cam causes the bowl to tilt at a given spot and pour metal into the mold. The bowl continues around while the conveyor brings new molds into position. About 125 tons of iron is poured on an 8-hour shift.

* * *

A 50-horsepower light plane engine of the 4-cylinder opposed type employs a nickel-chromium-molybdenum iron for its cast cylinder and crankcase assembly. It only weighs 150 pounds and is 29½ inches wide and 19.3 inches high. Composition of the alloy iron which is melted in the electric furnace, is 3.00 to 3.25 per cent total carbon, 2.10 per cent silicon, 1.50 per cent nickel, 0.30 per cent chromium, and 0.50 per cent molybdenum. In the as cast condition the 1.2-inch standard test bar shows a tensile strength of 50,000 pounds per square inch, and the average brinell hardness is 240.

* * *

After some experimental work an English foundry standardized on an aluminum alloy containing 4 per cent silicon, 2 per cent copper, 2 per cent nickel, remainder aluminum for permanent mold casting of a variety of automotive applications. The alloy is said to cast well, is relatively free from cracking and pulling, does not suffer serious aging over a period of time after casting, and has fairly good strength and ductility.

* * *

Investigation on the effect of aluminum and antimony on red brass of the 85-5-5-5 composition indicate that a quantity of aluminum as small as 0.005 per cent has a deleterious effect while antimony can run as high as 0.25 per cent. In a discussion on the minimum amount of aluminum which can be detected by the whitish metallic sheen on brass, it was stated that 0.015 per cent was the limit. Below that point the sheen would not be observable.

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A portion of the Hawkins ore mine, located in the Mesaba range.

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We invite users of alloy and carbon steel and pig iron to write or phone us for complete information about our products.

WISCONSIN STEEL COMPANY
180 North Michigan Avenue Chicago, Illinois

Photo by Chicago Aerial Survey Co.

Above: The Wisconsin Steel Company plant from the air, a complete plant with facilities for every step in alloy and carbon steel and pig iron production. *Right:* Wisconsin Steel's three modern blast furnaces produce all grades of iron required by the foundry industry.

WISCONSIN

Alloy and Carbon Steel **Pig Iron**

THE ADVENTURES OF BILL

By PAT DWYER

Drawings By RICHEY

RECENT exceptional fall of snow lent additional interest to foreign pictures and news items dealing with a certain area in northern Europe where it is alleged the armed troops of two belligerent nations are hard at work taking away each others' lives and placing as many bodies as possible in permanent cold storage. The carefully prepared dispatches one day showed the local boys popping up out of snow banks, dragging machine guns behind them with one hand. The guns are maneuvered with the greatest of ease among the trees and swung into position to mow the enemy down as readily as the wheat, the rye, the barley and oat crops were mowed down by the same gunners as farmers in former years when no red naggers came around to pester them.

Dispatches on the following day indicate that the rumors on the preceding day were not quite up to the mark. To continue the agrarian reference in the preceding paragraph, numerous stalks of cockle appeared among the wheat. Instead of wading through snow up to their oxters, the invaders swooped down in a flock of the most modern airplanes, dropped large bombs filled with highly explosive and dangerous compounds, and wrecked every building and every human being in an area with an unpronounceable name. After reading this "He's up! He's down. He's up" stuff for several months the diligent reader finds himself exactly where he started. In a general way he has an impression that the country is covered with snow thickly impregnated with the bodies of men who had no personal quarrel with each other and who stood to gain nothing irrespective of whether the tide of battle flowed one way or the other. The diligent reader also may be pardoned if he shudders at the prospect confronting any person roaming through the woods after the snow has disappeared in the spring. He will have no reason for thinking he is in the garden of Arcady or that he will catch a glimpse of Titania on the bank where the wild thyme blows, where oxlips and the nodding violet grows quite overcanopied with luscious woodbine, with sweet musk roses and with eglantine. The late Mr. Shakespeare had a happy gift in the choice of words.

Bill claims he has given up the practice of reading the so-called war news. In the first place he says he has no confidence in dispatches written by special correspondents whose jobs depend on flashy sensationalism rather than accuracy. He reposes even less confidence, if that is possible, on the statements attributed to those who conduct the war from their safe seats in high places. Life is too short, is the way he puts it, to waste even a short part reading a bunch of baloney.

"In the second place," he says, "to tell you the plain, honest truth, I am kind of hazy about the location of this here now place buried in snow. I did not get a proper grip on the geography when I was going through school and I never had any occasion to study this particular country, or for that matter any foreign country, since I rambled out into the broad field of industry. Modestly creeping along in the background, I have been kept busy keeping body and soul together, gleaning scattered grains left on the ground after the big combines have stripped the field, and roared away to the spending places in the cities.

War correspondent leads risky life

"Seems to me I spent more time improving the spelling and adding to the illustrations than I did in absorbing information from the faithful old geography. Rather remarkable and highly hilarious effects may be achieved by the addition or substitution of certain letters, or by a few strokes of a pencil on the outlines of a map. Looking back now I wonder occasionally why the teacher did not find a way to turn this originality to useful account instead of condemning it wholeheartedly and prophesying that the artist never would be an ornament in the sphere to which he had been assigned by divine providence. Any boy who wasted his time doodlebug dawdling was bound to become a bum in a ragged suit, or the inmate of a certain type of institution where the state kindly provided uniforms with the stripes running round and round instead of up and down. As with many another prophet since that time the teacher's batting average was 0.000 per cent.

"I have not seen a geography for many years, but since schoolboy traditions and customs never change, I assume the famous old warning still is written on the flyleaf: 'Don't steal this book for fear of your life. The owner carries a big jack knife.' This occasionally was varied to read a butcher knife, a long, sharp knife or a poisoned knife. Irrespective of the wording of this stern warning, the page always was ornamented with the owner's own conception of the weapon, ranging from a crooked dagger with drops of poison oozing from the tip of the blade to a Malay kriss, 3 feet long and serated along the edge, the better to lay you wide open, my dear!

"This was the original dyed in the wool, blown in the bottle warning and was copied faithfully by approximately 75 per cent of the student body. The remaining 25 per cent represented (a) the care-

(*Continued on page* 50)

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Foundrymen praise this improved seacoal because of the remarkable results which it achieves. No surprise to its many users is the 20 per cent saving effected in facing costs because of its superb quality. Less is required, because it is screened to match sand grain size and therefore distributes more equably and effectively. CHARLEROI is made from the highest grade of Pennsylvania lump gas coal, famous for its volatile and carbon richness. Pulverized in frictionless grinders, it retains a maximum of volatile carbon. CHARLEROI is available in seven uniformly screened grades for every foundry need.

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For **PERMEABILITY**

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In the preparation of sand, all foundrymen know that *adequate bond strength* results in fewer sags and drops; *correct permeability* and *proper moisture content* in fewer blows. They also know that a bond that develops the *proper dry strength* prevents cuts, washes and other defects. Federal Green Bond has ALL the essential qualities for such performance, whether it be in a small jobbing shop or the largest production shop with continuous sand conveyor system. It works uniformly under ANY and ALL conditions. Federal Green Bond makes it easy to control green or dry strength and permeability — without sacrificing one to attain the other. You can run the moisture content in your sand to suit conditions without danger, because moisture variation in tempering the sand does not radically effect its unusual bonding power. Sand bonded with Federal Green Bond "flows" better and "rams" well, too. It is *the* ideal bonding medium — why not try Federal Green Bond in your foundry?

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ADVERTISING PAGES REMOVED

(*Continued from page* 48)

less or forgetful lads who never can remember anything they should remember, and (b) the bright, original boys who coined variations. The careless boys wrote 'Steal not this book for fear of strife, for here you see my butcher knife.' The original lads concluded the warning with the threat, 'You'll have a widow instead of a wife!' "

"Seems to me," I said, "this blood-thirsty motive was not universal. Through a small judicious bit of bartering and trading I once acquired a battered grammar—a branch of education I cordially detested—with the modest warning on the flyleaf, 'If this book should chance to roam, kick its pants and send it home.' A variation of this reasonable, though generally useless request read, 'If this book gets off the track, give it a kick—alternatively, slap its ears—and send it back.' Indicative of a form of knowledge practically nonexistent amongst the younger generation was the notice I found in an old arithmetic, 'Do not steal this book, my lad. Fifty cents it cost my Dad!' I bet that lad had $47 in the bank before he was graduated and an equity in a house and lot before he was 21."

"I have heard of prodigies like that," Bill admitted, "youngsters who realize that the old man's stocking is not inexhaustible, but up to the present I have not met any of 'em. Flippant attitude of the majority is found in the warning, 'Take not this book for want of knowledge. If you do, you'll land in Sing Sing college.' "

"I heard of a fellow one time," I said, "who lost a big brass bound prayer book in spite of a notice typewritten on the inside, 'My name I place within this book to act as a reminder, so it may be returned to me by any honest finder. It is a present from my wife who warned me not to lose it, because, said she, no other man has such great need to use it!' "

"Wives," said Bill, "are a great help—sometimes. I think the writer of the following must have been a hermit or a confirmed old bachelor, 'Steal not this book, my honest friend, for fear the gallows will be your end. When you die the Lord will say: Where is that book you stole away? And if you say—you coward—you do not know, the Lord will say: 'Go down Be-Lo-o-o-w!'

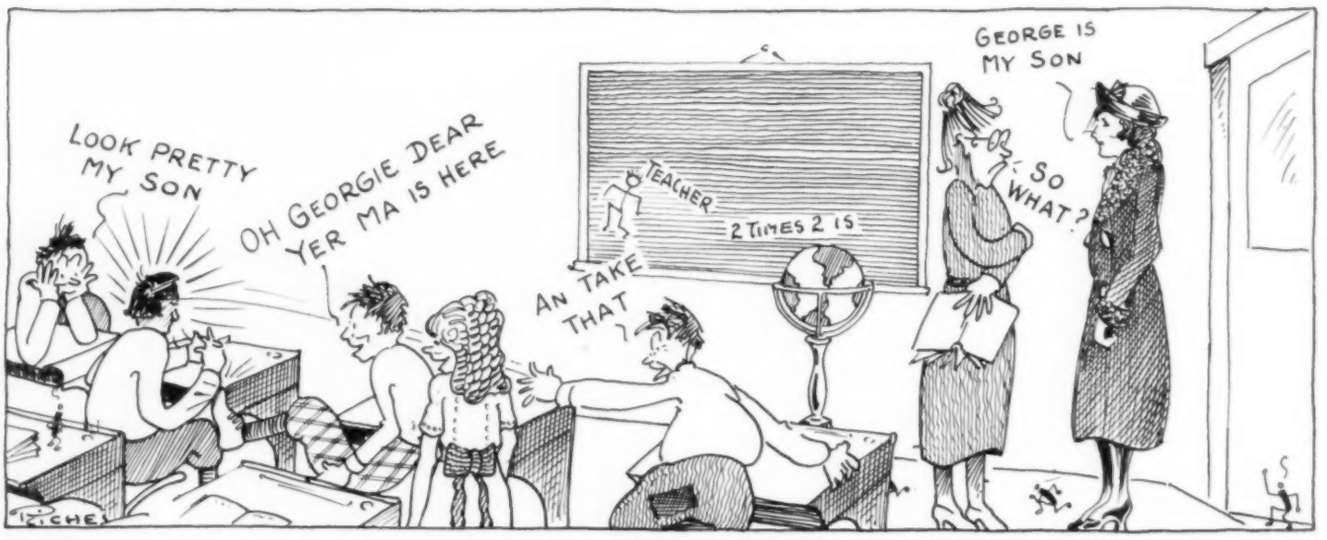
"Well, after looking 'em all over, my personal preference is for a couple of straight-forward warnings scrawled on the back of a map of South America. The map was in a book which apparently crept into my desk one day under its own power. Something I never could understand. The perverse law which causes inanimate objects to move from one place to another without the agency of human hands. I had no difficulty in understanding the plain, simple message: 'Keep your paws off this book and avoid a fuss. How would you like a poke in the puss?' The second warning was equally clear and to the point: 'Hands off. Hands off, if you want to miss a poke in the slats or a belt on the kisser.'

"However," said Bill, "so far as I know, none of these notices prevented the loss of books. Millions of words have been written about foundry practice and yet castings are lost every day in the foundry. I had an inquiry the other day from a man who was having trouble with a bronze ring 60 inches diameter, 1½ inches thick and 10-inch face. In some of the castings porosity or segregation appeared half-way down the face. He had made molds with and without copes and had vented inside and outside the ring with a ¼-inch wire. The mold was faced with a mixture of old and new No. 1 Albany sand and sea coal. The face was sprayed with graphite, linseed oil and kerosene oil. The walls of the mold were carried up 3 inches higher than the casting and flared out to a width of 3 inches. In the latest attempt the metal was poured into the flared opening from three pots spaced equidistantly. The metal, 85 three 5's was melted in an open flame, oil fired furnace. Other castings poured from the same metal were satisfactory in every respect.

"I pointed out that since the other castings are satisfactory it is reasonable to assume that metal nor melting practice is at fault. Pouring a ring in open sand is common practice, although in this instance no necessity exists for flaring the entire ring on the top. Three flared areas about 4 inches wide will serve as sprues. The remainder of the riser ring need not exceed the thickness of the lower part. This will eliminate melting so much excess metal.

"The mold condition and the action of the rising metal are responsible for the defective areas. Spraying the face of the mold is not necessary. If the mold is not skin dried, spraying is actually detrimental since the material is combustible and develops a great volume of gas. The ideal mold is one in which neither steam nor any other form of gas is developed. Unfortunately, that condition cannot be attained in a green sand mold. The aim of the molder should be to approach the condition as nearly as possible. Steam and gas can escape readily through soft sand. Sand must be rammed fairly hard, particularly around the bottom to prevent the ring casting from straining. Steam from the hard, dense and damp walls will cause a certain amount of commotion in the metal. Dust and small particles

(*Concluded on page* 98)



Rising generation of ladies and gentlemen enjoy themselves during unexpected open period. Bless their dear little hearts!

Quad City

JANUARY meeting of the Quad-City Chapter of the A. F. A., held at the LeClaire hotel, Moline, Ill., Jan. 15. Herman Alex, Rock Island Arsenal and chairman of the chapter presided.

A talking movie entitled, "Manufacture of Car Wheels," was presented first and this was followed by the principal speaker, Dr. J. A. Ridderhof, director of research, Frederic B. Stevens, Inc., Detroit, who spoke on "Foundry Facings, Their Description and Applications."

Foundry facings, an important factor in the foundry work, were used back in the early ages in making castings. A complete description of requirements and features of various facings including seacoal, plumbago and core washes, was given by Dr. Ridderhof. Partings also were discussed and the uses of various partings outlined. Questions on facings relating to the how and why of using of certain types for various jobs, and a discussion of chills also were given consideration by the speaker.—*J. Morgan Johnson, secretary-treasurer.*

Birmingham

REGULAR meeting of the Birmingham District Chapter of the A. F. A. was held Jan. 19 at the Tutwiler hotel. Despite the coldest weather in several years, 75 were present to hear J. A. Kayser, chief refractories engineer, Laclede-Christy Clay Products Co., discuss "Foundry Refractories." Mr. Kayser's interesting and instructive talk covered the manufacture of various types of fire brick and the various properties of fire brick obtained by use of different clays and by different methods of manufacture. Cupola refractories were discussed at length and it was brought out that the best cupola lining material was of necessity a compromise between the most desirable properties of refractories, mechanical strength, chemical inertness and spalling resistance.

Following the talk, Mr. Kayser answered a number of specific questions as to the best refractories for particular services.—*C. K. Donoho, program chairman.*

Buffalo

PATTERNS was the subject of discussion at the Feb. 2 meeting of the Buffalo Chapter of the A. F. A., held at Hotel Touraine, Buffalo. Approximately 75 members and guests attended and William Corbett, Atlas Steel Casting Co., and chairman of the chapter, presided. Herbert Corthorp of the Buffalo fire department, presented the coffee talk entitled, "Fire Prevention." He discussed the fire prevention work of the department and stated that Buffalo's fire department ranks second in the United States in efficiency.

Vaughan Reid, president, City Pattern Works, Detroit, was the principal speaker and he discussed "Patterns." Mr. Reid gave valuable information on the general construction, metals used, type of glues, shellacs and lumber best suited for all kinds of pattern work.

Next meeting of the chapter will be held March 1, at Hotel Touraine and will be Salesmen's night. Four will speak, each describing his particular product.—*J. R. Wark, secretary.*

Pittsburgh

MELTING practice and the production of aluminum from mine to finished product featured the January program of the Pittsburgh Foundrymen's association. A sound motion picture, presented by representatives of the Aluminum Corp. of America, traced the processes used in manufacture of aluminum and aluminum products from the bauxite operations to finished goods.

The principal speaker of the evening was Frederick G. Sefing, International Nickel Co., New York, whose paper on "Influence of the Condition of the Molten Metal on the Soundness and Properties of Castings" brought out considerable discussion.

According to Mr. Sefing, the variations occurring in melting practice influence properties of the metal so markedly that they transcend minor differences in composition in their effects on the finished castings. In a general sense, the speaker discussed gas in the metal when freezing, and nonmetallic inclusions. He discussed in some detail the effects of cleanliness, slag control, oxide and sulphide content and pouring temperature on steel castings. Melting and pouring temperatures on gray iron came in for considerable scrutiny, and several factors affecting malleable or chilled cast iron were outlined, including deoxidation, pouring temperatures and chill capacity.

Mr. Sefing also outlined proper practice on brass, bronzes, aluminum and other nonferrous alloys, and discussed the uses of alloy additions to obtain properties in castings not otherwise attainable, as well as to insure consistency in the desired properties.—*By R. L. Hartford.*

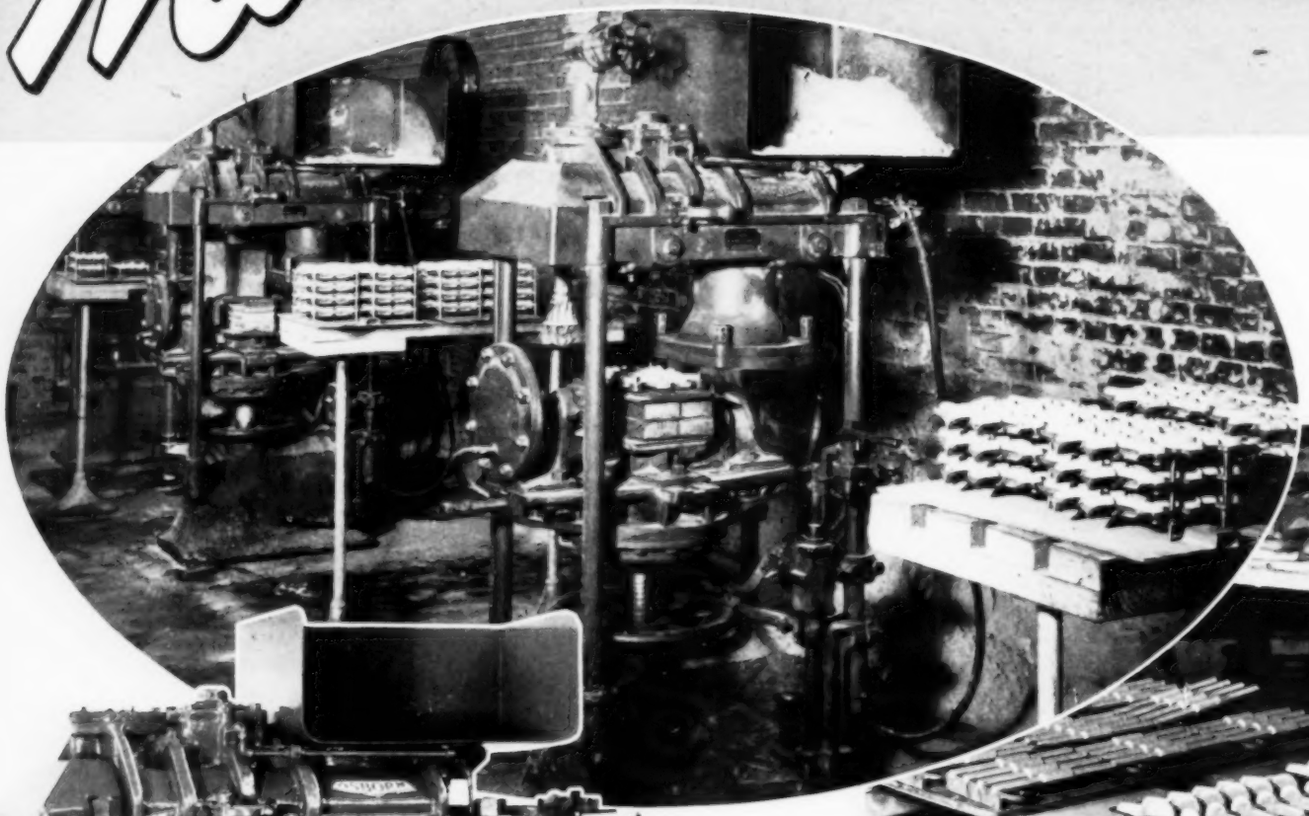
Central New York

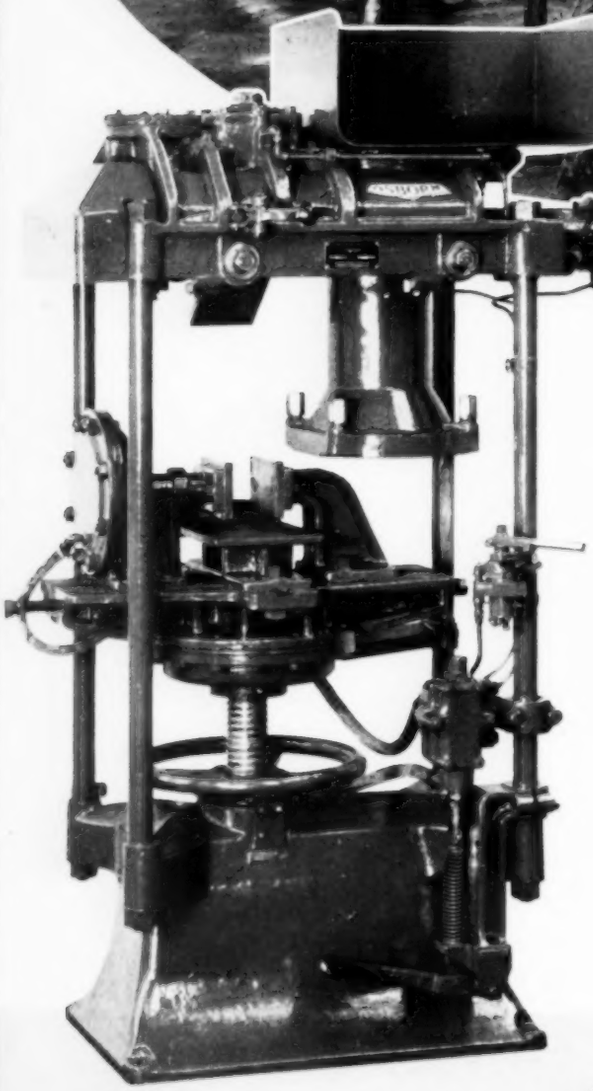
FINAL lecture in a series of four on "Metallurgy of Cast Iron" was presented by Frederick G. Sefing, International Nickel Co., New York, at the Jan. 12 meeting of the Central New York Chapter of the A. F. A. held at the Onondaga hotel, Syracuse, N. Y. H. H. Judson, Goulds Pumps, Inc., Seneca Falls, N. Y., and chairman of the chapter, presided.

"Foundry Factors Affecting Cast Iron," was the subject considered in the final lecture, and covered the design and service requirements related to the chemical and physical properties of metallurgy structure. Mr. Sefing discussed chemical analysis, cupola practice, frequent

(*Continued on page* 56)

Modern CORE BLOWING CONTRIBUTES TO . .





(Top photograph) Osborn Core Blowing Machines at ***The Republic Brass Company***, 1623 East 45th Street, Cleveland, Ohio.

(At left) Close-up view of an Osborn Core Blower.

(Above) A few of the many types and sizes of cores blown on Osborn Core Blowing Machines at ***The Republic Brass Company***.

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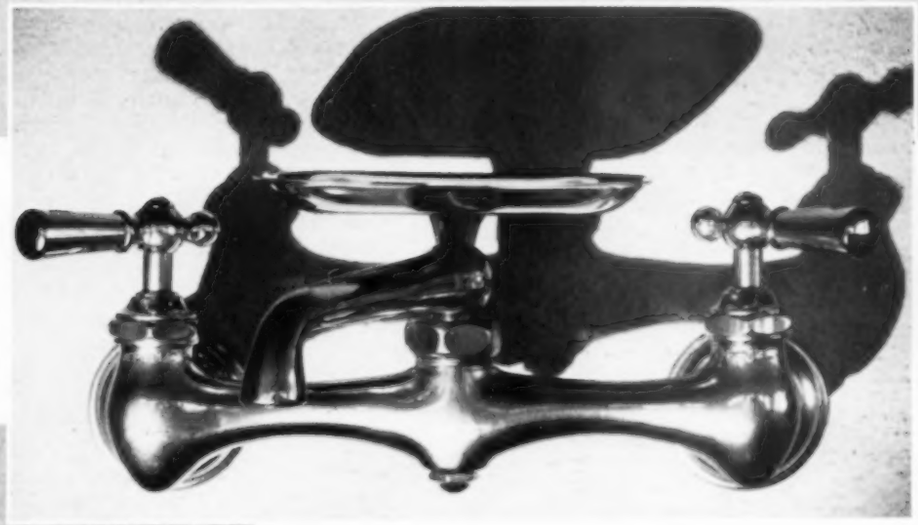
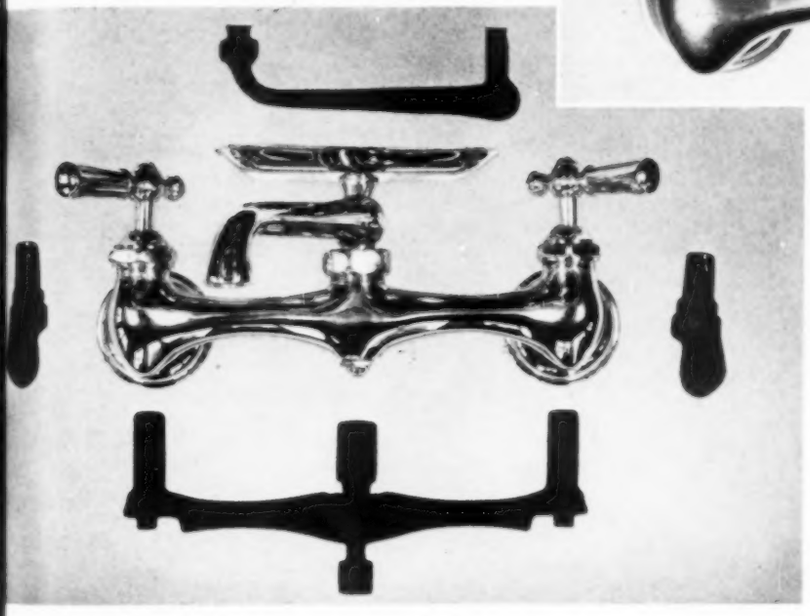
Modern CRAFTSMANSHIP



(Below) Cores for the product illustrated, are produced on the Osborn Core Blowing Machines shown on the opposite page.



(Above) A reflection of modern styling in brass plumbing fixtures...a combination sink faucet with renewable seats, swinging spout and all metal handles. This is one of a great diversity of modern plumbing fixtures and fittings manufactured by ***The Republic Brass Company***, Cleveland, Ohio.

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(*Continued from page* 53)
or continuous tapping, ladles, ladle additions of ferroalloys, gas in the metal, nonmetallic inclusions and other factors affecting the casting of gray iron.—*L. D. Wright, secretary.*

New York-New Jersey

RUNNING the gamut of foundry processes from cupola operation to dust control, a group of eight experienced foundry equipment suppliers described their various products and told some 85 guests and members attending the Feb. 5 "Equipment Night" meeting of the Metropolitan New York—New Jersey Chapter of the A. F. A. at the Essex House, Newark, N. J., of the latest refinements and developments in foundry operation. The important part which the equipment makers have played in the growth and progress of the foundry industry was emphasized by comparison of present-day methods with those used only a few years ago.

Introduced by technical chairman J. W. Reid, Robins Conveying Belt Co., Passaic, N. J., A. W. Gregg, foundry engineer, Whiting Corp., Harvey, Ill., described equipment for washing cupola stack gases to eliminate dust and sparks. Mr. Gregg stated 95 per cent of all solid matter is removed from the gases, an amount which may reach a total as high as 1 ton per day in a foundry melting at the rate of 200 tons of iron every 24 hours.

Comments regarding sand conveying and preparation were given by R. J. Heisserman, Link Belt Co., Chicago, in his description of the sand handling and drying equipment in a modern iron and steel foundry. Passing then to molding, Thomas Kaveny, President, Herman Pneumatic Machine Co. briefly outlined the plans under way for a $2,000,000 foundry which is to house the world's largest roll-over machine —a machine weighing 34,000 pounds, capable of handling molds up to 20 tons. The latest improvements in core oven design were offered by Jasper Willsea, Willsea Works, Rochester, N. Y., who stressed the value of positive convection air circulation and adequate oven insulation.

That ever-important phase of foundry operation, materials control, was covered by Harry W. Dietert, Harry W. Dietert Co., Detroit, who described instruments for testing sand and measuring metal temperatures as well as equipment for quick carbon and sulphur determinations and spectro-analysis. The cycle was completed by short talks on grinding and cleaning with Joseph A. Lange, Manhattan Rubber Mfg. division, Raybestos-Manhattan Co., Passaic, N. J. commenting on the former item and pointing out the trend to higher speed grinding wheels. The advances made in recent years in the cleaning of castings were outlined by James Rigby, American Foundry Equipment Co., Mishawaka, Ind., while modern methods of eliminating the dust problem attending the abrasive blast cleaning process were described by W. D. Vedder, Pangborn Corp., Hagerstown, Md.

Chapter chairman W. E. Day, Jr., Mack Mfg. Co., New Brunswick, N. J., presided at the meeting. James R. Allan, International Harvester Co., Chicago, will speak at the March 4 meeting on "Dust Elimination and Foundry Equipment *Codes.*"—*K. A. De Longe, technical secretary.*

New Jersey

REGULAR meeting of the New Jersey Foundrymen's association was held Jan. 8 at the Downtown club, Newark, N. J. W. G. Reichert, foundry metallurgist, American Brake Shoe & Foundry Co., Mahwah, N. J., summarized "Up-to-Date Cupola Practice." Last year the New Jersey Foundrymen's association made a survey of cupola practice in 25 local foundries and at a round table discussion determined the majority local opinion on several controversial points. From that data Mr. Reichert prepared a complete report of recommended cupola practice under the following headings: Daubing, sand bottom, tap and slag

(*Continued on page* 58)

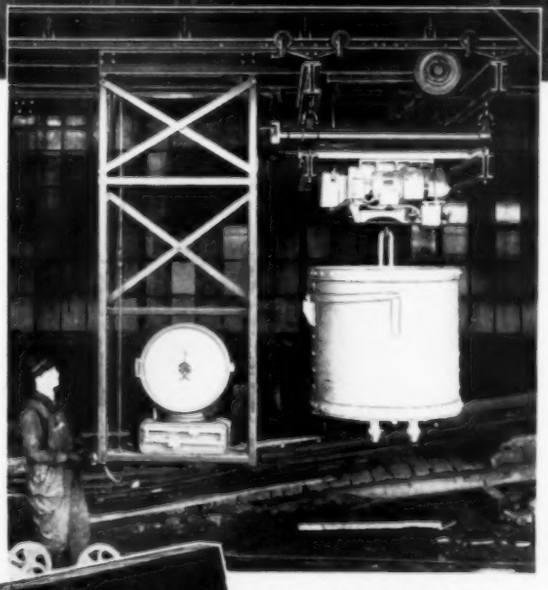
Views taken at the Metropolitan New York-New Jersey chapter meeting. Top left—Reading left to right, W. E. Day Jr., Mack Mfg. Co.; J. W. Reid, Robins Conveying Belt Co., and R. E. Nesbitt, Pratt institute. Left below—Reading left to right, G. W. Lambker, Sterling Wheelbarrow Co.; G. A. Wallace, Debevoise-Anderson Co.; B. E. Beldin, Whitehead Bros. Co.; G. E. Hadzima, Robins Conveying Belt Co.; A. R. Rhodes, Debevoise-Anderson Co., and Mr. Dette, Robins Conveying Belt Co. Right below—Left to right around the circle, R. J. Maddison, Whitehead Bros. Co.; H. C. Seidel, Penn-Rilton Co.; C. A. Somers, Whitehead Bros. Co.; F. L. Middleton, Ajax Metal Co.; L. Fisher, Fisher Casting Co.; W. J. Coane, Ajax Metal Co.; K. V. Wheeler, Eastern Foundry Co.; K. DeLong, International Nickel Co.; George Hochgesang, American Brake Shoe & Foundry Co., and Fred Kosley, Whitehead Bros. Co. Photos courtesy W. B. Coleman, W. B. Coleman Co., Philadelphia

Mechanical *Cupola Charging*

ABOVE—Traveling scale carrier delivers accurate charge to cupola at half the former cost.

CENTER—Cupola charger lowers bottom-dump bucket to deposit material in uniform layers.

LOWER—Traveling crane type carrier assures accurate weight and careful handling of charge.



Scientific foundry practice demands control of all materials in the charge. And profits are determined by the cost of handling these materials. Both can be obtained today by mechanical charging.

With scale units controlling the weight of materials on the carrier, half the handling labor can be turned to more productive use. Buckets arrive at the charger in faster intervals for careful lowering and uniform changing to insure equal distribution of heat.

Reports indicate that such methods result in greater plant capacity without further expansion; improved practice throughout the foundry; lower costs with increased opportunity for profits.

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(*Continued from page* 56)

holes, putting in bed, charging, sequence of charging, limestone, soaking time, tuyeres, reactions in the cupola, height of bed and relation to pressure, air volume, coke reactivity, coke size, melting rate, coke and iron charges, coke ratio, tapping practice, tapping temperature, front slagger, mixing ladles, forehearth, tilting spout, desulphurizing.

Mr. Reichert read the report and explained it, showing lantern slides of some of the important data. There was a discussion and vote on all controversial points which had not been covered last year. The report is being rewritten, incorporating the results of the discussion and will be issued as the New Jersey Foundrymen's association's "Recommended Cupola Practice." Approximately 100 foundrymen attended and there were lively discussions on some features of the report. One result of the discussion was a resolution that the association take steps to enable local foundries to obtain properly sized coke in the district.—*John L. Carter, secretary.*

Wisconsin

JANUARY meeting of the Wisconsin Chapter of the A. F. A. was held at the Schroeder hotel, Milwaukee, Jan. 19 with approximately 110 present. B. D. Claffey, General Malleable Corp., Waukesha, Wis., and vice president of the chapter presided. An interesting coffee talk was presented by Russ Oaks, hobby lobbyist.

The principal speaker of the evening was Col. N. F. Ramsey, commanding officer, Rock Island Arsenal, Rock Island, Ill. His subject was, "Foundries' Place in National Defense Program." The first section of the paper by Colonel Ramsey appears on page 28 of this issue of THE FOUNDRY.—*A. C. Ziebell, secretary.*

Northern Iowa

JOINT meeting of the Northern Iowa Foundrymen's association and the Waterloo Technical society was held at Blacks' Tea room, Thursday, Jan. 18. Attendance was considerably reduced due to snow and cold weather. Through the courtesy of the Aluminum Co. of America, a movie film was presented showing the manufacture of aluminum from the mining of the ore through the various steps to obtain metallic aluminum. Second section of the film showed the fabrication of aluminum by various methods. Sand castings, permanent mold casting, hot and cold rolling of plates, structural material, etc., fabrication by extrusion, and other interesting features were shown.— *R. Wilke, secretary.*

Northeastern Ohio

FOLLOWING the usual monthly dinner Feb. 8 at the Tudor Arms, Cleveland, over 125 members and guests of the Northeastern Ohio Chapter A. F. A., saw and heard a double feature program dealing with the manufacture of chilled car wheels, and with copper in cast iron. The first feature, a moving picture with vocal accompaniment, was presented through the courtesy of the Association of manufacturers of Chilled Car Wheels. The second feature, a paper on copper in cast iron, was presented by Tom Barlow, Copper, Iron and Steel Development association, Cleveland.

Ed. Follman, member of the chapter and superintendent of the Cleveland Production Co., local unit of the Griffin Wheel Co., presented an interesting introduction to the subject before the car wheel picture was projected on the screen. Standards of acceptance on chilled car wheels probably are higher, tests are more severe and tolerances are narrower than on any other class of castings. Chemical analysis and physical properties are held to exceedingly close limitations. In addition to presenting a clean, smooth surface, the wheel tread must be a true circle and must not show a variation over ¼-inch when taped for circumferential measurement. The only machine work on a wheel is a light cut in the bore two thousandths of an inch less than the diameter of the axle end on which it is forced by hydraulic pressure.

The picture with running vocal comment showed details of equipment and operation at the mechanized plant of the Griffin Wheel Co., Chicago. (Under the title "Trains Run on Chilled Wheels," this plant was described in a series of three articles in THE FOUNDRY, August, September and October, 1938).

According to Mr. Barlow the use of copper in cast iron is primarily either to obtain certain definite physical or engineering properties or to permit essential economies to the foundryman by decreasing scrap losses, machining costs and foundry costs. To accomplish this result, copper must be used judiciously, taking into account its many sided functions and considering that copper in common with other alloying elements is not in any way a cureall. Touching on the relative merits of silicon and copper as chill reducers and graphitizers the speaker claimed that silicon normally graphitizes all sections of cast iron. The adjustment of the carbon-silicon ratio for correct structure in light sections may induce porosity or weakness in the heavier sections. In a reversed situation the light sections may be chilled or unmachinable. Copper reduces chill in light sections which otherwise would contain free carbide, but does not increase the softness or porosity of heavy sections. Extended reference was made to the use of copper in connection with the use of other alloys and to typical examples of castings made from alloy irons. Copper may be added to cast iron in many ways. The best way usually is determined by local conditions. No particular trouble is experienced where ordinary precautions are observed.—*Pat Dwyer.*

St. Louis

PRINCIPAL speaker of the Jan. 11 meeting of the St. Louis District Chapter of the A. F. A. was C. A. Barnett, president and general manager, Foundry Equipment Co., Cleveland, who discussed "Core Baking and Mold Drying." The talk was well illustrated with slides picturing many installations of core ovens. Mr. Barnett described details of these installations and at the same time gave some interesting information and pertinent data in connection with core baking.

The coffee talk was given by J. B. Norris, in charge of the St. Louis office of the Federal bureau of investigation. He was accompanied by Mr. Lewis of the same organization who, incidentally, informed the chapter that he was an A. E. F. *buddy* of Carter Bliss, vice chairman of the chapter, and further stated that to the best of his knowledge Mr. Bliss was the only officer in the A. E. F. who found it possible for his men to do away with a whole carload of jam and jelly consigned elsewhere.

During the board of directors meeting which preceded the regular chapter session, it was voted to set up a substantial prize list for the local apprentice contest which is now under way in anticipation of the final contest in the national organization. This is the first time the St. Louis chapter has done this, and it looks forward to favorable results.

Further information was given in connection with the Kansas City extension meeting which is to be held by the St. Louis chapter in Kansas City, Mo., during March.

"Occupational Disease Hazards" was the subject presented by James R. Allan, International Harvester Co., Chicago, at the meeting of the

(*Concluded on page* 60)

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ADVERTISING PAGES REMOVED

(*Concluded from page* 58)

St. Louis District Chapter of A.F.A. held Feb. 8. Mr. Allan in his subject, covered many features of definite interest to the large group present and keen interest was displayed during the talk and in the interesting question and answer period that followed.

Immediately following dinner a young Boy Scout, Raymond Newsham, gave a brief talk describing the work done by the Boy Scout organization and directing attention to the present campaign to increase membership. Also a sound movie, "Play Ball America" presenting many highlights of baseball, was given as the coffee talk feature of the evening.

Special attention was directed toward the extension meeting which is to be held at the Continental hotel, Kansas City, Mo., March 9. That meeting is an annual feature of the St. Louis District chapter's work and represents an effort to expand the sound principles of A.F.A. to new fields. Speaker for that meeting will be L. H. Rudesill, Griffin Wheel Co., Chicago. Chairman of the meeting will be A. O. Nilles, Griffin Wheel Co., North Kansas City, Kans.

The following were named as the nominating committee to submit nominees for chapter officers for the year 1940-41: Tom Hamlin, Webb L. Kammerer, Joe Walsch, C. B. Shanley, Roy Jacobsen, J. E. Kelin, and L. E. Everett.—*J. W. Kelin, secretary-treasurer.*

Foundrymen To Meet At Rutgers

The melting and testing of metals will be discussed from both the consumers' and producers' viewpoints at the second annual Rutgers regional conference to be held March 30 at New Brunswick, N. J., under the sponsorship of the Philadelphia Chapter and Metropolitan New York-New Jersey Chapter of the A.F.A. and the department of mechanical engineering, Rutgers university. The meeting will feature four prominent speakers selected with the view of having as many varied opinions represented as possible. This same thought was carried out at the 1939 meeting and because of the enthusiastic reception of this idea, it was decided to follow the same theme this year.

In 1939 over 200 foundrymen, representing practically every important plant in the seaboard area, attended the meeting, and from the interest already evidenced in the 1940 gathering it is likely that attendance will exceed 300.

The conference will open at 9 a.m., Saturday, with registration. Then, following an address of welcome by P. H. Daggett, dean of engineering at the university, the technical sessions will be held in the following order:

10:00 a.m.—Melting.
Chairman, Sam Tour, Lucius Pitkin, Inc., New York.
Steel, by John Howe Hall, consulting metallurgist, Philadelphia.
Gray Iron, by Donald J. Reese, International Nickel Co., New York.
Nonferrous, by Henry Gieseke, Ajax Electric Furnace Corp., Philadelphia.

12:30 p.m.—Luncheon.

2:00 p.m.—Testing and Inspection of Castings.
Chairman, Norman Mochel, Westinghouse Electric & Mfg. Co., Philadelphia.
The Producers' Viewpoint, by Max Kuniansky, Lynchburg Foundry Co., Lynchburg, Va.
The Consumers' Viewpoint, by Dr. N. E. Woldman, Eclipse Aviation Corp., Bendix, N. J.

6:00 p.m.—Banquet.
Toastmaster, W. B. Coleman, W. B. Coleman Co., Philadelphia, director, A.F.A., and secretary-treasurer of Philadelphia chapter.
Speaker, Dr. Robert C. Clothier, president of Rutgers university.

Dr. Clothier, the banquet speaker, is widely known for his understanding studies of personnel problems. During the World war he served as a member of the committee on classification of personnel in the army, seeing duty both here and abroad and he is the co-author of the book, *Personnel Management*. Previous to his assuming the presidency of Rutgers, he was dean of men at the University of Pittsburgh.

The arrangements for the conference were made by a committee consisting of representatives of both chapters and the university. The personnel of the committee is as follows:

New York-New Jersey chapter: Fred G. Sefing, general chairman, International Nickel Co., New York; W. A. Phair, *The Iron Age*, New York; T. D. Parker, Climax Molybdenum Co., New York; R. E. Nesbitt, Pratt institute, Brooklyn, N. Y.

Philadelphia chapter: W. B. Coleman, W. B. Coleman Co., Philadelphia; W. C. Hartmann, Bethlehem Steel Co., Bethlehem, Pa.; H. L. Henszey, Carborundum Co., Philadelphia; R. J. Keeley, Ajax Metal Co., Philadelphia.

Rutgers university: Prof. W. C. Schulte, department of mechanical engineering.

Committee on healthful working conditions, National Association of Manufacturers, 14 West Forty-ninth street, New York, recently has published a booklet entitled, "Who's Too Small—For Industrial Health?" This booklet represents the results of a study of the small plant problem in relation to the health of employes.

To Discuss Electric Steel Melting

A series of lectures on the principles of electric steel melting will be held at Battelle Memorial institute, Columbus, O. on March 21, 22, and 23. The series is sponsored by the Steel Founders' Society of America and the Electric Metal Makers' guild, and will be directed by Charles W. Briggs, technical advisor, Steel Founders' society, 920 Midland building, Cleveland. Tentative program is as follows:

Thursday, March 21

9:00 to 9:30 a.m.—Registration
9:30 to 9:45 a.m.—Address of welcome
C. E. Williams, director, Battelle Memorial institute
9:45 to 10:45 a.m.—Electric steel melting furnaces
N. R. Stansel, General Electric Co.
11:10 to 12:10 a.m.—Electrodes
T. L. Nelson, National Carbon Co.
2:00 to 3:00 p.m.—Refractories and linings
L. S. Fry, Joslyn Mfg. & Supply Co.
3:30 to 4:30 p.m.—Raw materials
A. J. Scheid Jr., Columbia Tool Steel Co.

Friday, March 22

9:00 to 9:30 a.m.—Review and summary of previous day's lectures
9:30 to 11:00 a.m.—Fundamentals of chemistry of steel making
C. H. Herty Jr., Bethlehem Steel Co.
1:30 to 3:30 p.m.—Application of chemistry to acid and basic practice
C. E. Sims, Battelle Memorial institute

Saturday, March 23

9:00 to 9:30 a.m.—Review and summary of previous day's lectures
9:30 to 10:00 a.m.—Power and economics
H. W. Gillett, Battelle Memorial institute
10:15 to 11:30 a.m.—Operation methods
C. W. Briggs, Steel Founders' Society of America
1:30 to 2:30 p.m.—Fluidity and temperature measurements
C. H. Lorig, Battelle Memorial institute
3:00 to 4:00 p.m.—Tapping and metal transfer
C. W. Briggs, Steel Founders' Society of America
4:00 to 5:00 p.m.—Discussion and summary.

New England Plans M.I.T. Meeting

Fourth regional foundry conference under the joint sponsorship of the New England Foundrymen's association, the American Foundrymen's association, and the Massachusetts Institute of Technology, will be held at the institute, Friday and Saturday, March 29 and 30.

The subjects to be discussed at the sessions of the conference are briefly: Safety and health; manganese bronze; cupola practice; rebonded sands shrinkage in nonferrous castings; pattern equipment.

Tentative program is as follows:

Friday, March 29

9:00 a.m.—Registration.
10:15 a.m.—Opening remarks.
Chairman, A. S. Wright, Hunt-Spiller Mfg. Corp., South Boston, Mass. Wel-

(*Concluded on page* 63)

(*Concluded from page 60*)

come by Prof. J. M. Lessells, Massachusetts Institute of Technology.

10:30 a.m.—*Luman S. Brown session.
Chairman, A. B. Root Jr., Hunt-Spiller Mfg. Corp., South Boston, Mass.
A Small Foundry's Attempt To Stimulate Individual and Group Safety Consciousness and Health Betterment, by Peter E. Rentschler, president, Hamilton Foundry & Machine Co., Hamilton, O.

12:30 p.m.—Luncheon, North hall, Walker Memorial.

2:00 p.m.—**Technical session.
Co-chairmen, D. Wesley Case, president, Connecticut Nonferrous Foundrymen's association, and Howard A. Phelps, president, Phelps Foundry Co., Ansonia, Conn.
Manganese Bronze, by S. W. Chappell Sr., foundry superintendent, Electric Boat Co., Groton, Conn.

3:30 p.m.—Technical session.
Chairman, Henry Jensen, General Electric Co., Lynn, Mass.
Practical Cupola Practice, by Horace A. Deane, assistant works manager, American Brake Shoe & Foundry Co., Mahwah, N. J.

6:00 p.m.—Conference dinner, North hall, Walker Memorial, Charles O. Butler, presiding.
Speakers: Edward L. Moreland, dean of engineering, Massachusetts Institute of Technology; Henry S. Washburn, president Plainville Casting Co., Plainville, Conn., and president, American Foundrymen's association.
Iron Men of New England, a sound moving picture produced by the Mystic Iron Works and the New England Coke Co.
Touching All Bases, official American League motion picture of 1940.

Saturday, March 30

9:00 a.m.—Registration.

10:00 a.m.—Technical session.
Chairman R. F. Harrington, Hunt-Spiller Mfg. Corp., South Boston, Mass.
Proper Preparation and Testing of Rebonded Sands, by N. J. Dunbeck, vice president, Eastern Clay Products Inc., Eifort, O.

12:10 p.m.—Luncheon, North hall, Walker Memorial.
Coffee talk by Leroy P. Robinson, director of core oil sales, Werner G. Smith Co., Cleveland.

2:00 p.m.—Technical session.
Chairman, D. Frank O'Connor, Walworth Co., South Boston, Mass.
Shrinkage in Nonferrous Castings, by David Tamor, plant metallurgist, Reading Pratt & Cady division, American Chain & Cable Co., Hartford, Conn.

3:30 p.m.—Technical session.
Chairman, B. L. Gray, Washburn Shops, Worcester Polytechnic institute.
Production Pattern Equipment — Methods and Metals Used, by Vaughan Reid, president, City Pattern Works, Detroit.

5:15 p.m.—Adjournment.

*In memory of Luman S. Brown, who for many years was president of the Springfield Facing Co., this session is dedicated.

**Sponsored by the Connecticut Nonferrous Foundrymen's association.

Attendance at the conference will require registration in the main lobby. The registration fee will be $1.00. The conference dinner will be held at 6:00 p.m. on Friday and group luncheons will be served at 12:30 on Friday and 12:10 on Saturday at North hall, Walker Memorial. Local representatives of the foundry supply companies again are sponsoring the foundrymen's smoker at the Hotel Lenox on Saturday evening, March 20.

Committee in charge of conference arrangements is comprised of the following: Chairman, Charles O. Butler, Warren Pipe Co. of Mass., Inc., Everett, Mass.; vice chairman, A. S. Wright, Hunt-Spiller Mfg. Corp., South Boston, Mass.; Edward N. Brough, Fairbanks Scale Co., St. Johnsbury, Vt.; R. F. Harrington, Hunt-Spiller Mfg. Corp.; Prof. P. E. Kyle, Massachusetts Institute of Technology, Cambridge, Mass.; Prof. J. M. Lessells, Massachusetts Institute of Technology; D. L. Parker, Foundry division, General Electric Co., Lynn, Mass.; Howard A. Phelps, Phelps Foundry Co., Ansonia, Conn.; Walter M. Saunders Jr., metallurgist, Providence, R. I.; Louis G. Tarantino, Connecticut Nonferrous Foundrymen's association, Bridgeport, Conn.; H. S. Washburn Jr., Connecticut Foundrymen's association, Plainville, Conn.; Francis LeBaron, E. L. LeBaron Foundry Co., Brockton, Mass.

Registration and reception committee is comprised of local representatives of the foundry supply companies with R. H. Hehm, Whitehead Bros. Co., Providence, R. I., acting as chairman and T. C. Wilson, Republic Steel Corp., Boston, as treasurer.

Organizations co-operating in the regional conference are the Connecticut Nonferrous Foundrymen's association, Connecticut Foundrymen's association; American Institute of Mining and Metallurgical Engineers, American Society of Mechanical Engineers, American Society for Metals and the American Welding society.

Covers Activities Of Navy Ashore

In connection with the annual observance of Navy Day, Oct. 17, the master mechanics, foremen and head draftsmen's association, Norfolk navy yard, Portsmouth, Va., issues an attractive brochure titled *Navy Ashore*, covering with text and illustrations current and historical events, incidents and activities of the oldest navy yard in the United States. The 1939 edition is quite up to and in some respects superior to the publication issued in preceding years. A foreword explains the origin of Navy Day and pays tribute to the navy. Oct. 27 may be considered the birthday of the American navy because on that date, 1775, a bill providing for the construction of the first ships was presented to the Continental congress.

Familiar in a general way with the navy afloat, only a comparatively small part of the population has any knowledge of the extent and importance of the navy ashore. Statistical data on the Norfolk navy yard supplied by H. M. Simons, rear admiral, U. S. N., commandant, show that this unit in the chain of navy yards on the Atlantic and Pacific is one of the largest industries in Virginia. On July 31, 1939, the number of civilian employes was 8307. This number probably will be increased to 10,000 when work on the battleship ALABAMA is well under way. The average monthly payroll for 1939 was $959,534.65, total annual payroll $11,514,415.75. Value of special work and projects completed during fiscal year, $9,421,598.58. Estimated cost of projects under way $86,632,082.30. Value of gas manufactured $52,196.04. Galvanizing work $19,505.71. Foundry products $736,733.35. Additions to plant $3,316,750.51.

Contrasted with these figures it is interesting to note that in 1777, one Thomas Talbot entered into a contract with the navy commissioners to furnish necessary timber for a frigate. The contract price was $3333.33 and it was estimated that 200 oak and 150 pine trees would be required.

"History of Our Navy Yard," by Commander A. W. Askorook, presents a long and detailed description of incidents connected with the yard for the past 150 years. Commencing as a marine yard used by the British before the revolutionary war, ownership at various periods was controlled by the United States, the state of Virginia, the United States, the Confederate States of America, and again the federal government.

One of the most interesting pages in the publication shows every type of naval vessel with explanation of the system employed in naming them. The navy department recently announced adoption of a standardized program. Previous tradition will be followed as far as possible as in naming battleships after states. The four projected 35,000-ton battleships will be known as the ALABAMA, INDIANA, MASSACHUSETTS, and SOUTH DAKOTA. Rules have been added to cover new types of auxiliary vessels. The illustrations show types of ships, sources chosen for their names and typical examples.

Division of simplified practice, National bureau of standards, has announced that simplified practice recommendation R53-36, "Classification of Iron and Steel Scrap," has been reaffirmed without change by the standing committee of the industry. This recommendation became effective originally in 1926 and was revised in 1928, reaffirmed in 1935 and again revised in 1936.

Reader's Comment

EDITOR'S NOTE — *Material Appearing Under this Head Does Not Necessarily Reflect the Opinion of The Foundry or of Its Editors.*

A Greater Demand

TO THE EDITORS:

Two items in the February issue of THE FOUNDRY particularly attracted my attention. An editorial quotes the experience of the E. W. Bliss Co. with two presses, one built by welded assembly, the other from iron castings, with emphasis on the superiority of the cast iron unit. In the past few years we have not seen many articles of this kind. We have read many articles and advertisements yes very clever advertisements too, pointing to pieces formerly made of castings, but now fabricated by welding. This form of publicity has had a double effect, one good and one bad, on the foundry industry and on the manufacturers who supply equipment and supplies. The mere fact that the foundry industry is one of the oldest and best established of industries may have caused somewhat of a stagnation in development, but the recent publicity given the change from castings to fabricated pieces certainly has awakened all of us. Results are apparent and excellent. Present day castings in all classes present physical properties that would have been considered impossible of attainment a few years ago.

There are many places for fabricated pieces, all rolled material or a combination of rolled pieces and castings, but the pendulum has swung much too far in the publicity accorded that form of construction. Improvement in castings in recent years extensively publicized in the written and spoken form will go a long way toward bringing the trend back where it should be. Let's have more articles on the subject and have them published where designers, engineers and buyers will see them.

The other, or bad effect is that which prompted the letter of *Discouraged Apprentice*. So much has appeared in print about castings losing out it is little wonder that many connected with the foundry industry believe the future to be very dreary. Young men hesitate to enter the industry. Some executives doubt whether it is worth while to modernize their foundries. New foundries like those of the Key Co., East St. Louis; International Harvester Co., Indianapolis, Ind., and the Cincinnati Milling Machine Co., Cincinnati, should go a long way to dispell the fear about the future of the industry. These foundries are, or will be, as modern as present day science and experience can make them. These firms are not spending millions of dollars if the remotest contingency existed that in a few years there will be no demand for castings. Apparently their opinion leans in the opposite direction and they are planning for a greater casting demand than now exists.

THOMAS J. KAVENY JR.
Vice President,
Herman Pneumatic Machine Co.
Pittsburgh

No Loss

TO THE EDITORS:

We would ask that you correct a statement which is made on page 38, January, 1940 issue of THE FOUNDRY. The statement reads as follows, "While, as you mention, automobile cylinder blocks may contain chromium, molybdenum and nickel, we believe that remelting will leave only a small amount of chromium and molybdenum in the final metal since those elements are oxidized easily."

We feel that one is not justified in making statements under the heading "we believe" when the facts are available and so easily obtained. We are not presuming to defend chromium except to state that very little chromium is lost in remelting because of the large amount of silicon and carbon present to protect it. In the case of molybdenum, we are able to cite from practical usage several plants charging molybdenum and molybdenum-containing scrap in the cupola and reporting 100 per cent recovery of the molybdenum charged. It has been demonstrated many times that we are able to charge molybdenum oxide and obtain complete reduction to ferromolybdenum, by the molten iron. This would prove the iron oxidizes more readily than molybdenum, and one need not worry about the loss of molybdenum so long as molten iron is present.

V. A. CROSBY
Climax Molybdenum Co. of Michigan
Detroit.

Book Review

Physics (*Physik*), by Dr. Paul Wessel, fabricoid, 550 pages, 5 x 8 inches, published by Ernst Reinhardt, Munich, Germany, and sup-

This German book which is designed not only for study at technical colleges and universities, but also for application in practice, is an excellent, up to date presentation of a basic science. Striking features of the book are the use of bold face type to stress definitions, formulas, basic principles, laws, etc., and a list of almost 1500 questions with references on where the answers may be located in the book. Still another feature is a short recapitulation and condensation of all the material including formulas appearing previously. The book is divided into three main sections of which the first deals with the introduction, mechanics, wave studies and acoustics, heat, and optics. The second section deals with magnetism, electricity, electronics and atomics. Section three contains the previously mentioned recapitulation, questions and answers and tables.

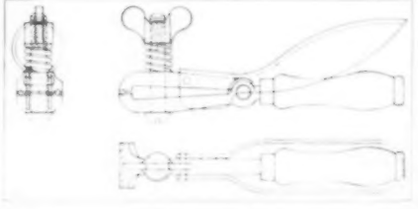
Puts Spring Clamp On Hand Vise

By John W. Gerdel

In overhauling a number of permanent molds in an aluminum foundry it was necessary to clear the vents. Some of the molds had U. S. taper pins with 0.010-inch slots from end to end. Size of the pins varied from No. 0000 to No. 3 U. S. taper and from ¼ to ½-inch in length. Number of slots varied from two to six.

The slots were cleaned out with a hack saw ground to a thickness of 0.008-inch for about ⅛-inch from the edge of the teeth. A 10-inch saw was brozen in two, a hole was ground in one end and the saw was held in a small frame. Difficulty was experienced in holding the pins in a bench vise. Attempt to hold them in the fingers soon wore off the skin. A number of *Vs* were filed in the jaws of an old hand vise. These held the pins very well, but it was difficult to hold the pins and the hand vise and operate the wing nut.

A longer screw was placed in the hand vise as shown in the accompanying illustration and a coil spring was placed between the vise and the wing nut. This permitted suitable tension to be applied. A sheet metal handle was formed and attached by a pin as shown.

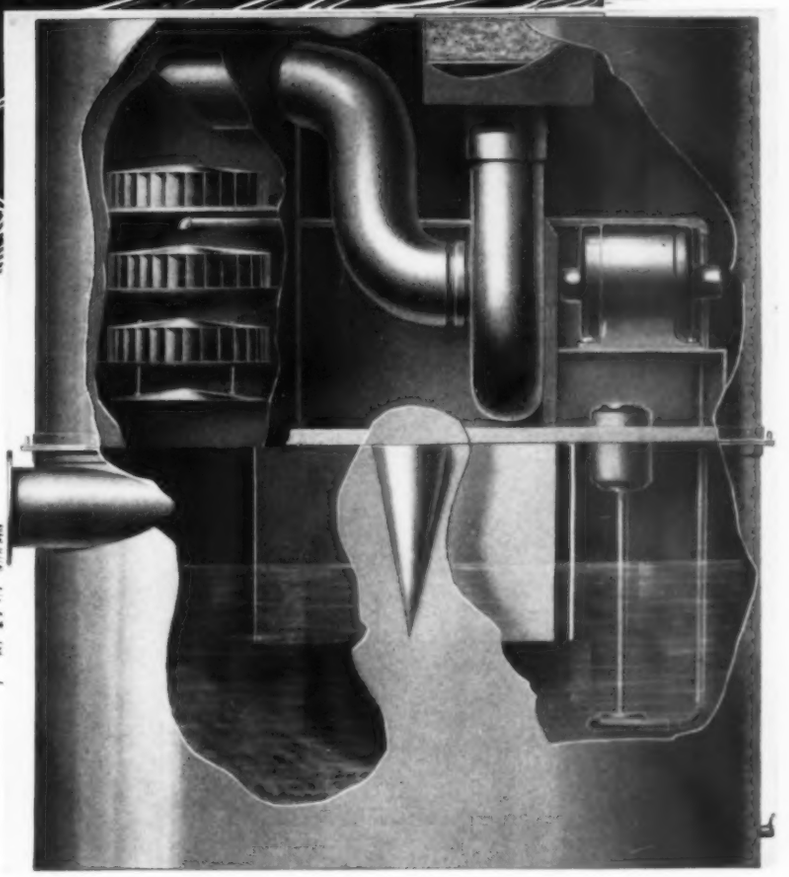


Hand vise equipped with wing nut, coil spring and sheet iron handle

for proper unit dust control—

The Schneible Midget

Multi-Wash Dust and Fume Collector



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The Schneible Midget Multi-Wash is the answer to every dust and fume suppression problem involving the ventilating of an isolated machine or operation that cannot be conveniently tied into a central control system.

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Abstracts

FROM WORLD FOUNDRY LITERATURE

Cast Iron Pipes

History on Pipes and Piping Through the Ages. (Le tuyau de canalisation a travers les ages) by Rene Colas, *Bulletin de l'Association Technique de Fonderie,* Paris, France, October, 1939.

A general historical review of the evolution of pipes and piping accompanied by illustrations from old prints of some of the primitive methods employed in the manufacture of pipes for various purposes. Beginning with the aqueducts of ancient Rome, the author traces their evolution from bored out logs, to pipes made of sheet lead rolled up around mandrels of wood or bronze (the channel formed by the abutting turned up edges being filled with molten lead), pipes made of clay, sandstone, cement and other substances, down to molded and centrifugally cast pipes. The article concludes with an extensive bibliography of historical references.

Inoculated Cast Iron

Tools for Deep-drawing and Pressing, by J. D. Jevons, *The Metal Industry,* London, England, Oct. 13, 1939.

This article, which is part of a series, concludes the author's discussion on cast iron as a tool for drawing and pressing. The previous installment appeared in the Oct. 7 issue of *The Metal Industry.* The author discusses further inoculated cast irons mentioning meehanite and nitensyl, and gives data on their physical properties in the as-cast and heat-treated conditions. He cites numerous advantages of cast iron including low cost with extreme ease of shaping and polishing, resistance to fouling and scoring, durability, ease of heat treatment and immunity from cracking and distortion, and the practicability of making a single casting replacing a built-up tool composed of a number of pieces. The author then goes on to discuss chromium plating of dies.

Facing Materials

Foundry Facings—Properties and Applications of Seacoal, Core Washes, Plumbago and Parting, by J. Ridderhof, Canadian Metals and Metallurgical Industries, Toronto, Canada.

According to the author seacoal is used in amounts from 1.5 to 6 per cent by weight or from 1 to 20 to 1 to 5 parts by volume, depending upon size and shape of the casting. It permits use of coarser sand than could be employed to produce same smoothness of surface without seacoal. Seacoal should be high in volatile matter, and low in sulphur, ash and moisture. Core washes may be compounded from carbon base materials such as graphite, coke and hard coal, and also from silica base materials. The author gives 10 points to be considered in making a core wash which include easy mixing with water, suspensibility, penetration into the core, good coverage, covering uniformly, not bubbling, foaming or fermenting, strong adherence to core, be heat resistant, dry without cracking or blistering, and peeling easily from casting. The author also discusses plumbago and partings mentioning that at present ground limestone and calcium phosphate are giving good service for the latter use.

Alloy Additions

A Note on the Effect of the Addition of Molybdenum, Tungsten and Titanium, Together with Calcium Silicide, to Cast Iron, by J. E. Hurst, *Foundry Trade Journal,* London, England, Oct. 19, 1939.

The author in this article describes experimental work on a method for making alloy additions by using an oxide of the alloy agent with a reducing agent such as calcium silicide. Yield of molybdenum from oxide with excess calcium silicide compared favorably with yield from powdered ferromolybdenum. Very high ultimate tensile and transverse breaking strengths were observed with both oxide and ferro additions. With joint additions of calcium silicide and molybdenum as oxide or ferro, sulphur is reduced noticeably. Yield of tungsten from oxide and calcium silicide was not as good as in case of molybdenum; with large excess of calcium silicide, yield was 60 per cent tungsten. Yield of titanium from titanium oxide and calcium silicide addition was exceptionally low. In spite of that the additions had a noticeable effect in reducing combined carbon. Strength values also were substantially lower than previous experiments.

Pouring Castings

A Study of Some of the Points Relating to the Pouring of Castings. (Etude de quelques points concernant la coulee des pieces en fonderie), by Felix Henon, *La Fonte,* Paris, France. May-June and July-August, 1939.

An exhaustive article on the above mentioned subject is published in two issues of the above publication. The first part discusses the points involved from the mathematical view-point, while the second part deals more with a discussion among others, of the advantages of different methods of pouring, gating, etc.

Cast Iron Corrosion

Contribution to the Study of Corrosion of Cast Iron by Chromic Acid. (Contribution a Petude de la corrosion des fontes par Pacid chromique by Jean Marechal, *La Fonte,* Paris, France, September,October, 1939.

As a result of tests made of the action of chromic acid on cast iron, the author recommends that cast iron tanks used for chromium plating be made of white cast iron or malleable cast iron with the lowest possible phosphorus content. Where the plating bath contains Cl- and Fe-ions, it may be necessary to use Ni-Cu austenitic cast irons, or even the Ni-Cu-Cr irons.

Nonferrous Costing

A French Costing System—Nonferrous Work Stressed, by Charles Dennery, *Engineer and Foundryman,* Johannesburg, South Africa, December, 1939.

Brief abstract of a paper presented by the author at the 1939 meeting of the French Foundry Technical association. He divides the foundry into 10 separate departments consisting of raw material stores, melting shop, sand preparation, molding floor, core shop, drying stoves, molding, finishing and assembling section, casting and stripping, cleaning, and casting stores. Brief information is given on just what each department does and the cost distribution. No figures are included to show all details of the system.

Cleaning Plating Solutions

Cleaning of Plating Solutions by Chester W. Smith, *The Metal Industry,* London, England, Nov. 10, 1939.

The author gives complete, detailed descriptions of cleaning various types of plating baths which have been in use for some time so that good smooth coatings may be obtained. In nickel plating, for example, the chief impurities which are objectionable and cause improper deposits are iron, copper, zinc, chromium and certain organic materials. Organic materials are removed by treatment with activated carbon. Iron copper and zinc are removed by heating the bath to 160 to 180 degrees Fahr.; adding nickel carbonate to raise the pH to 5.6 to 5.8 (about 4 pounds of fresh basic nickel carbonate per 100 pounds of solution); raise pH to 6.2 with chemical lime (about ¼ to ½-pound per 100 gallons); agitate by stirring for 1 hour. Then solution is allowed to cool and precipitate to settle, and filtered. Similar data is presented for other plating solutions such as copper and brass, cadmium and zinc. Information also is given on filtration and filtering materials.

Nonferrous Practice

Nonferrous Foundry Practice — the Magnesium Alloys, by J. Laing and R. T. Rolfe, *The Metal Industry,* London, England, Aug. 25, 1939.

This article is section XXVIII of a series on nonferrous foundry practice by the authors, and as the title indicates, relates to magnesium alloys. The authors point out that magnesium alloys have an approximate density of 1.85 or about two-thirds that of aluminum alloys. While tensile strengths from about 20,000 to 27,000 pounds per square inch are obtainable readily in the cast state, giving in comparison with other alloys a high strength-weight ratio. A special technique is required in melting and pouring, and manufacture is carried out under license. The authors include a number of tables showing the compositions of various alloys used in England, the United States and Germany, with information on physical properties.

EVER TRY TO BUY A USED S·P·O JOLT SQUEEZE MOLDING MACHINE ?

The No. 100 Series of SPO Jolt Squeeze Molding Machines is designed for speed, power and dependable operation; in short, to pay off the initial cost quickly and then go on making a good profit for the foundryman.

We don't know absolutely, of course, but we question whether you were able to find one. Thousands of SPO Jolt Squeeze Molding Machines are still being used by their original purchasers. Apparently these units are giving such satisfactory service that foundrymen refuse to part with them . . . Why? We don't know absolutely, of course, but we imagine that the reason must have something to do with their owners' statements of earnings.

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DETROIT AMONG FOUNDRIES

By A. H. ALLEN
Detroit Editor, The Foundry

NOT so many years ago book learning was sissy stuff for a foundryman. The best education and training were thought to be derived from actual work on the foundry floor. If a man had to get in the way of a little hot iron to round out his schooling in practical details, then so much the better. Metallurgists were college boys who had no place in a man's trade. They were always trying to apply theoretical ideas to an art which had been handed down from generation to generation by experts who needed no pyrometers or bunsen burners to tell them how to make good castings.

Improve Castings Quality

Of course, it is a different story today. As B. H. Newell, foundry superintendent at Buick, recently told this writer, more and more college men are picking the foundry as their field of endeavor. Metallurgical training is coming to be recognized as essential for supervisory forces. Laboratory and control staffs, working in close co-operation with melting department operators, are demonstrating how they can reduce costs and improve quality of castings.

So the cry goes up for more education. Teach the molders; teach the coremakers; teach the assistant superintendents. The pendulum swings in the direction of universal enlightenment. Sometimes one wonders whether the collective mind of industry's workmen may not at times sag under the weight of steady efforts to educate it. Bulletin boards and company newspapers are filled with educational articles and statistics. Trade magazines (such as this one) regularly bring their doses of education to hundreds of thousands busy in industry. Meetings and conferences are a part of plant routine, to further the education of workman and supervisory employe. Technical societies hold regular meetings in the interests of education. The demands upon the powers of absorption of the individual are steadily increased.

This is not to suggest that all these efforts at supplying instruction are not sincerely aimed at the betterment of the workman's ability to perform. Certainly they are. Certainly every man should make the most of the benefits offered.

One of the latest educational efforts in the Detroit district is the six-lecture course on fundamentals of foundry practice arranged by the local chapter of the A. F. A. First lecture was presented March 1. The succeeding five will be held weekly through to April 5 at the University of Detroit chemistry building. The chapter's educational committee, in charge of Fred J. Walls, International Nickel Co., was fortunate in securing seven capable speakers to present the lectures and as a concluding feature has scheduled a trip through the Ford foundry.

Arranged in logical sequence, the lectures will cover raw materials, core room practice, molding practice, melting practice, handling of castings and management problems. In addition to reviewing fundamentals in these various fields, the speakers are going to do a little looking ahead and try to sketch what developments may be expected in the next few years.

To Discuss Handling

Climax of the series is expected to be the presentation of John E. Linabury of the Saginaw Malleable division, General Motors Corp., on March 29. Although assigned the general subject of handling of castings, he plans to go considerably beyond this phase and will discuss many processes with which he is intimately familiar as a result of his work in designing and laying out practically all the foundries of General Motors Corp.

Mr. Linabury, a veritable beehive of new ideas is convinced that many of the manual foundry tasks of today readily could be mechanized or automatized with consequent savings. He foresees the possibilities of completely automatic preparation of molds for certain types of castings and also visions broad advances in centrifugal casting of many parts, even those of irregular contour.

These lectures are timed nicely. At the moment, Detroit foundries are finding the pressure on production easing off somewhat in keeping with the slight recession in automotive activity. By the end of this month, business is expected to show the normal spring improvement and the further impetus of early work on 1941 models will be added.

Already some of the die programs for new models are taking shape, particularly among the so-called independent car builders. Fisher Body is understood to have placed a preliminary deadline of July 15 on body dies for 1941 models, indicating that plans are under way to get new cars rolling in ample time for the New York auto show scheduled for Oct. 15-22.

Raise Work Standards

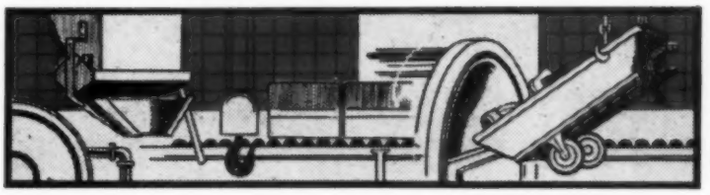
Molders at the General Foundry & Mfg. Co. at Flint, supplier of meehanite brake drums for trucks and trailers, are trying hard these days to keep out of the doghouse, part of a new plan to reduce scrap losses and stimulate interest of workmen in raising their standards of work. A large blackboard lists all molders by number and is ruled so that a week's output record can be recorded. To the left of the board are two doghouses, one for a daily occupant and one for a weekly tenant. Molders whose scrap returns exceed a predetermined amount are "put in the doghouse," to their own dismay and to the amusement of fellow workers. Those whose scrap losses remain in lower brackets compete for a monthly prize, divided among the six molders with the lowest percentages.

The company reports the novel plan has done much to improve employe relations as well as to reduce scrap losses.

Effective as such devices often prove, it is claimed they are ready targets for union organizers, continually seeking to level off all work to the plane of the least efficient workmen. Many auto plants have eliminated piecework rates in favor of straight hourly rates.

Pontiac Pattern & Engineering Co., Pontiac, has installed a small crucible furnace for the production of specialty and high-alloy irons in limited quantities.

NEW EQUIPMENT . . .



AND SUPPLIES

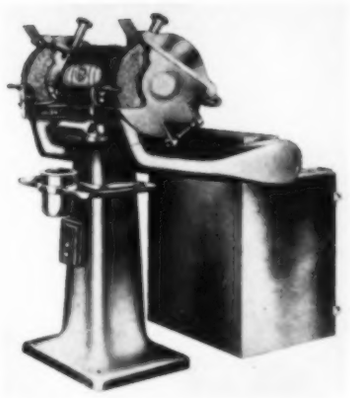
Face Shield

Mine Safety Appliances Co., Braddock, Thomas and Meade streets, Pittsburgh, announces a new line of face shields for which important advantages in design and construction are claimed. The new shield is available in three models, without spark shield, with semi-spark shield and

with full spark shield. Features stressed by the manufacturer include preformed head gear and center top strap which supports the weight without pressure, three way full headgear adjustment, finger control of friction adjustment permitting easy visor movement, and an aluminum visor edge binding which increases durability. The visor, which may be pushed upward, is a plastic in 4, 6 and 8-inch sizes, green or clear. Head gear is high quality moisture resistant fiber and sweat bands are genuine leather.

Air Purifier

Cincinnati Electrical Tool Co., subsidiary of R. K. LeBlond Machine Tool Co., Cincinnati, recently has developed a new air purifier attachment for grinders and buffers. The device sucks dust and grit off the grinding wheels and filters the air through a series of bags. Heavier particles fall into a large tray in the bottom of the cabinet. A foot lever is provided for shaking the lighter material from the filter bags into the tray which is removable for easy cleaning. It is claimed the unit is suitable for use with all makes of grinders and buffers having ex-



haust outlets. It is connected into the switch which controls the grinder or buffer and starts simultaneously with the machine. A fully enclosed motor, suction fan and filter bags are enclosed in a compact, lacquer finished, insulated cabinet mounted on rubber feet for quiet operation. A metal partition prevents dust and grindings from entering the motor compartment.

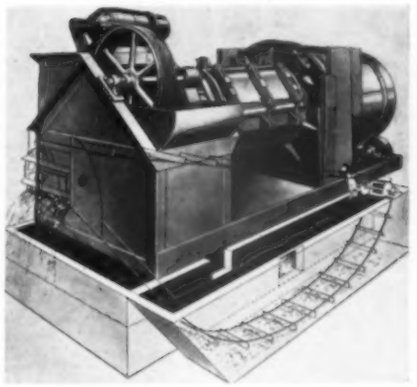
Lubricator

Ingersoll-Rand Co., Phillipsburg, N. J., has developed a new air line lubricator that will operate in any position. Designed originally for rock drill lubrication it can be used on many kinds of air operated tools. Adjustment of the oil feed can be made without taking the pressure off the chamber and without interrupting the work. The lubricator will not siphon back or leak when the air pressure is released. It can be filled in either the vertical or horizontal position. A partial vacuum created by the velocity of the air draws the oil from the chamber up through the pickup ring to the needle valve. The air then becomes oil laden and

is distributed to the tool. The amount is regulated by the needle valve which can be set for any desired flow. The needle valve is sealed in such a way that neither oil nor air can pass through it to the outside atmosphere.

Casting Cleaner

N. Ransohoff, Inc., West 71st street, Cincinnati, has developed a combination type machine, shown in the accompanying illustration, for



cleaning large castings. Advantages claimed include time and labor saving and dust elimination. The combination is a side loading wet tumbling barrel, an automatic end unloading star separation and return barrel and an automatic sand settler and remover. In a typical installation it is claimed the operating cycle of cleaning the castings has been reduced from 4 hours to 50 minutes.

Castings are hand packed in the usual manner. Stars flow automatically into the barrel and the entire contents are flushed continuously with a mild caustic solution, which removes the sand. At the close of the cycle a newly designed port is opened between the tumbling section and the star return section. The machine is reversed at half speed. The castings are discharged over a rotating screen. The stars are separated and held ready for automatic return to the tumbling section. Solution carrying the sand is caught

in a settling tank where a flight conveyor driven by a small motor removes the sand. The cleaning solution flows through a weir back into the main tank and into the tumbling barrel.

Vibratory Riddle

Universal Vibrating Screen Co., Deane boulevard and St. Paul railroad, Racine, Wis., has developed a light weight vibratory riddle shown

in accompanying illustrations. The riddle weighs 39 pounds and can be operated from any light socket. The machine can be held in the hands, operated on a small stand adjustable to any desired angle or it may be suspended in the air from suitable studs provided for the purpose.

The device was designed primarily for test purposes, preparation of samples, separation of various materials under conditions where it would be impracticable or inconvenient to employ a large screen. It is stated a new principle is employed in keeping the screen mesh clean and free from blinding, thus augmenting a powerful, vibratory separating action. Screen sections can be changed quickly.

Moisture Separator

Logan Engineering Co., 4912 Lawrence avenue, Chicago, has developed a line of units for removing moisture and oil from air and gas lines ⅜ to 10 inches diameter. It is claimed the device effectively removes dirt, scale, oil and moisture from compressed air and gas lines. The foreign matter impinges on a multiplicity of propeller blades which revolve in opposite directions and are propelled by the flow of air or gas. The arrested contamination and moisture is collected in the lower housing from where it is drawn off as occasion warrants. All sizes are simply constructed, easy to install in any line interior or exterior, operate without back pressure and

require only a periodical clean out. Units are designed for application to all compressed air lines in foundries.

Safety Goggle

American Optical Co., Southbridge, Mass., has introduced a new safety goggle with nonrubber head band. Eye cups are molded from a special material that combines light weight with high tensile strength and is not affected by exposure to water, oil, grease or perspiration. The eyecups have broad bearing surfaces and are set low to provide wide angle vision.

The goggle may be sterilized by any method. The new head band is a spring and ball chain covered with cloth. The chain prevents over extension of the spring, yet permits ready adjustment to any desired head size. When adjusted, it maintains the same tension indefinitely, or until it is released deliberately. Regular lenses are curved, clear, superarmor plate type. The caps which hold the lenses in place are

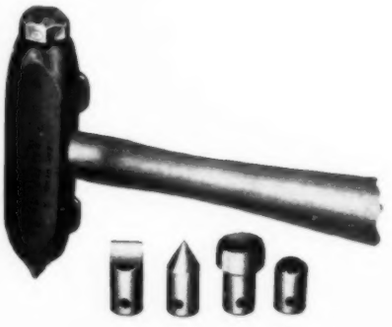
precision threaded to insure easy removal and replacement. Ventilation is provided by metal screens.

Crawler Shovel

Link-Belt Speeder Corp., 301 West Pershing road, Chicago, has designed a new line of crawler shovels 1½ to 2 cubic yards capacity, equipped with hydraulic power control and diesel, gasoline, oil or electric motor drive. Important features listed by the manufacturer include: New design throughout giving greater strength, life, stability and efficiency without the burden of extra weight; greater speed and ease of operation; safe travel control, steering and locking brakes entirely from operator's position in cab; automatic locking arrangement; increased ground clearance, 14½ to 18 inches; operating parts entirely enclosed; choice of crawler widths and lengths to suit any condition.

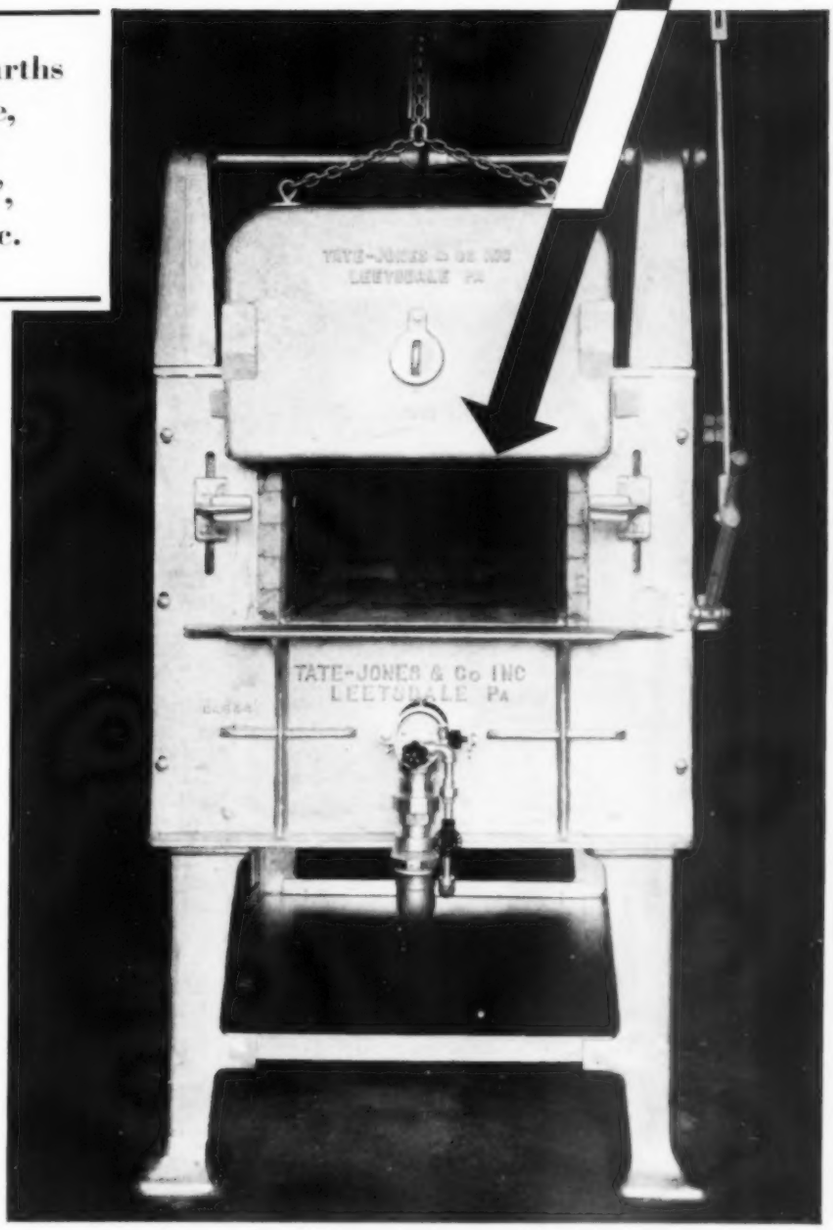
Inspectors Hammer

M. E. Cunningham Co., 155 East Carson street, Pittsburgh, has developed a new type inspector's hammer, shown in the accompanying illustration, for marking metals, timber, castings, pipes, shafts, etc. The hammer is available in four sizes, ¾, 1¼, 1½, and 2 pounds weight. It is claimed that immunity from spalling and mushrooming is one of the outstanding qualities of this steel. Interchangeable plugs of the same material are fitted on either end of the hammer and held in place by special spring pins. Special inserts may be had for any desired trade mark or other symbol.



Famous FURNACE BUILDER PRAISES "CARBOFRAX"

"We prefer 'Carbofrax' Hearths because of their long life, high conductivity and dimensional uniformity", say Tate-Jones & Co., Inc.



HERE'S a testimonial that is unusually impressive! Tate-Jones & Co., Inc., Leetsdale, Penna., is one of the country's oldest industrial furnace builders. They have been in business 41 years, and for twenty of those years have been regularly using "Carbofrax" hearths. Read what they have to say.

"Our preference for 'Carbofrax' Hearths is the result of a combination of factors, rather than just one. We prefer them because of their longer life, their high conductivity and dimensional uniformity. They permit lower combustion chamber temperature and eliminate the neccessity of using a hearth of much greater relative thickness in another material for the same load".

That's real praise, coming from people with twenty years experience with "Carbofrax"! Doesn't it suggest that these hearths should be in *your* furnace . . . effecting savings for *you*? Our representative will be glad to survey your plant and offer recommendations.

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THE CARBORUNDUM COMPANY

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Refractory Division, Perth Amboy, N. J.

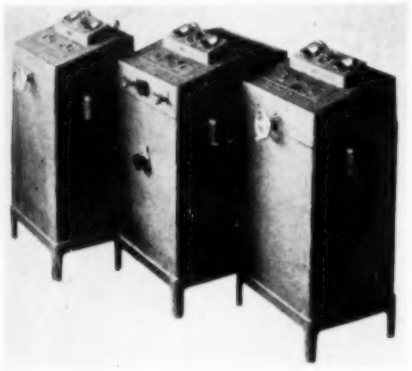
District Sales Branches: Boston, Chicago, Cleveland, Detroit, Philadelphia, Pittsburgh. Agents: McConnell Sales and Engineering Corp., Birmingham, Ala.; Christy Fire Brick Company, St. Louis; Harrison & Company, Salt Lake City, Utah; Pacific Abrasive Supply Co., Los Angeles, San Francisco, Seattle; Denver Fireclay Co., El Paso, Texas.

(Carborundum and Carbofrax are registered trade-marks of The Carborundum Company)

Power Source Units

Harry W. Dietert Co., 9330 Roselawn avenue, Detroit, has introduced three electrical power source units shown in the accompanying illustration, for spectro-chemical analysis. It is claimed that high quantitative analytical accuracy can be achieved only by strict and convenient control of conditions of current used to excite the sample. With either of the three electrical power source units it is pointed out, the error due to light source is at a minimum.

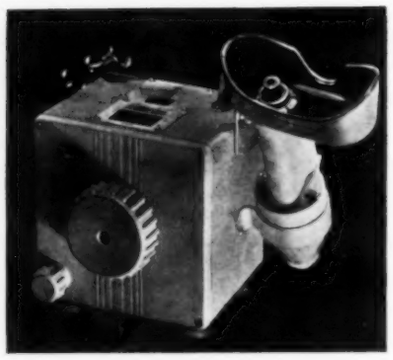
The unit at the left of the illustration is a 3 kilowatt arc rectifier unit for exciting the sample with 250 volts, 4 to 14 ampere, direct current. The unit shown in the center, a high voltage spark unit excites the sample with 35,000 volts, 2 kilowatt, alternating current. A 5-kilo-



watt high voltage arc unit for exciting the sample with 2500 volts, 2 to 5 amperes, alternating arc current, is shown at the right. Each unit is equipped with voltmeter, ammeter, automatic timer, safety relay, power control and necessary switches mounted on an inclined switch board panel. The units are available to work in conjunction with any type of spectrograph.

Optical Pyrometer

Leeds and Northrup Co., 4907 Stenton avenue, Philadelphia, has developed a new temperature measuring instrument. Calibrated not in milliamperes, but directly in temperature degrees, it is claimed the instrument measures temperatures more conveniently and with greater accuracy. Optically, this instrument employs the disappearing filament method used by commercial standardizing laboratories and by the National bureau of standards for the precise high temperautre measurements. Electrically, the instrument is a potentiometer employing the precise high temperature meas-



field glasses the instrument can be sighted on any object that can be seen. Temperatures are taken by adjusting two knobs on the potentiometer which reads directly in degrees. Standard ranges are from 1400 to 5200 degrees Fahr. (775 to 2800 Cent.)

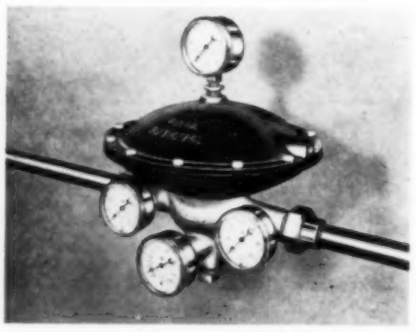
Welder and Cutter

Linde Air Products Co., 30 East 42nd street, New York, has made a number of changes in a line of welding and cutting apparatus including a welding blow pipe, cutting blow pipe and cutting attachment. All retain the detachable valve body construction, exclusive with the company's equipment, which permits quick changing from welding to cutting and vice versa. In the welding blow pipe an individual mixer in the head corrects flame adjustment and resists flash back.

Oxygen and acetylene for this balanced pressure blow pipe may be set at approximately the same pressure in pounds per square inch as the number on the head. The welding head provides a long, slender flame with a well formed inner cone that permits thorough heating of the bottom of the *V* and provides good control of the welding puddle.

Air-Oil Control

North American Mfg. Co., 2910 E. 75th street, Cleveland, recently has developed a device for maintaining definite control over the atmospheric conditions in the heating chambers of oil fired furnaces. It is stated that the device has been tested in the laboratory and under plant operating conditions for some time where it maintained a constant temperature in the furnace and showed a saving in oil consumption. The device, shown in the accompanying illustration, is said to accurately proportion the flow of fuel oil and the combustion air by controlling pressures and making them dependent on each other. The air pressure alone becomes the dominant factor. Number of burners and their individual settings have no effect on the operation. A constant atmosphere is claimed to be maintained despite fluctuations of oil or air pressure, or despite varying rates of fuel input or the manipulation of individual burners.



Welding Helmet

Chicago Eye Shield Co., 2300 Warren boulevard, Chicago, has developed a light proof, seamless weld-

ing helmet with reinforcing side ribs, as shown in the accompanying illustration. Made in one piece from vulcanized fiber and without rivets, this new welding helmet has been designed with two reinforcing ribs on each side. Molded in the fiber it is claimed these ribs strengthen the helmet, add to its rigidity and prevent warping. Another feature listed is a newly designed lens holder which may be removed by loosing two screws. The cover glass or welding lens may be removed or replaced quickly and readily without the use of tools. The head gear can be adjusted to required size and will remain in that position until a change may be necessary.

Wheelbarrow Tire

B. F. Goodrich Co., Akron, O., has developed a solid rubber tire for wheelbarrows. The 3 x 16-inch tire is cured directly on the wheel and is claimed to have given highly satisfactory results in foundries, and other places where tires often are over loaded or subjected to hard service. With the new solid tire the company announces a new type

(Concluded on page 76)

BUILT WITH Machine Tool Precision!

Milwaukee
CORE GRINDER

Here's a sturdy, all-purpose machine that will grind small cores continuously or large cores (up to 72″ in diameter) intermittently. The table can be rotated in either direction and the wheel set on either side to fit into existing core handling systems. The table is mounted on 1″ ball bearings in a 44″ diameter race. Column and wheel spindle are mounted on liberal sized ball bearings. The machine throughout is ruggedly built to insure smooth, vibrationless performance. It will pay you to replace existing improvised core grinders with this Milwaukee machine specifically designed for core grinding jobs. Write for complete detailed information.

MILWAUKEE MOLDERS are available in a wide range of models—*Jolt Squeezers, Jolt Strippers, Jolt Squeezing Strippers, Power Strippers, Jolt Rollover Draws.* Every machine is a fast, high-production unit. Ask for literature.

MILWAUKEE FOUNDRY EQUIPMENT CO.

3238 WEST PIERCE STREET • Cable Address "MILMOLDCO" • MILWAUKEE, WISCONSIN

(*Concluded from page* 74)

wheel for pneumatic tires with bearings sealed against dust and dirt and designed for heavy duty service. The bearing seals eliminate wear on bearings and axles.

Magnet Crane

Harnischfeger Corp., 4200 West National avenue, Milwaukee, recently has developed a magnet crane shown in the accompanying illustration with 39-inch diameter

magnet and 40-foot boom. The crane has a lifting capacity of 5200 pounds on 25-foot radius and 9800 pounds on a 15-foot radius. Equipped with modern magnet cable reel and an 85-foot tag line the crane is driven by a 35 horsepower motor generator set working under 220 volts, 3 phase, 50 cycle current. A tail cable bracket prevents the cable from catching on or under the crawler track. The crane has three forward speeds ranging from ⅝ to 2½ miles per hour.

Pyrometer

Russell Electric Co., 343 West Huron street, Chicago, has introduced a new black finish for its line of pyrometers, which is impervious to oil and the tarnishing characteristics of bright metal. It is claimed the lance pyrometer was developed to meet the need for a low cost dependable heat checking instrument which checks temperatures instantly and accurately within a tolerance of 2 per cent. Tips are easily replaceable. Reading is direct and cold end adjustment is manual. No battery or electrical connections are necessary. Thermocouples of various types are available in lengths up to 6 feet. For checking the temperature of tin, lead, solder, babbitt, type metal, spelter and brass, a type with open tips is recommended. The molten metal eventually eats away the tips. The holder permits inexpensive tip replacement. Other type tips are available for aluminum and

for checking liquids that are nonconductors.

Blue Print Machine

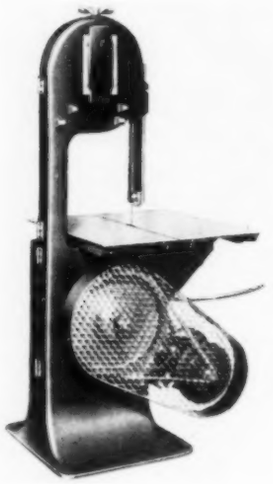
Charles Bruning Co., Inc., 100 Reade street, New York, announces a new type blue print machine embodying as a major improvement the use of the Hanovia Chemical and Manufacturing Co., new high pressure mercury quartz lamp. It is claimed that test runs have been made on the new blue print machine at a speed of 20 feet per minute from new pencil and ink tracings on medium speed paper. In addition to the lamp the machine presents many mechanical innovations in safety, improved feeding, speed control, drive, elimination of tracing slippage and wear. The new lamp, it is claimed, provides positive, uniform distribution of light to the entire printing surface without flickering.

Grinder

Sawyer Electrical Mfg. Co., Los Angeles, has introduced an aerial type grinder available in 1, 1½ and 2 horsepower sizes for the portable and 2 1/3-horsepower size for the suspended aerial type. Low maintenance cost is claimed through sturdy electrical construction which eliminates commutator brushes and centrifugal switches. The motor is totally enclosed. The rotor is an integral part of the shaft and this unit mounted on antifriction ball bearings is the only rotating part. Specifications on all sizes include a 220 volt, 3 phase, 60 cycle motor. Speed of all sizes with the exception of the high speed gear driven machine is 3600 revolutions per minute. The high speed unit is geared to drive at 5400 revolutions per minute. Weights range from 16 pounds for the 1 horsepower unit to 65 pounds on the suspended 3½ horsepower grinding unit.

Metal Band Saw

Wells Mfg. Corp., 315 Seventh avenue, Three Rivers, Mich., recently has placed on the market an upright metal and wood cutting band saw claimed to meet requirements of the foundryman, die maker, patternmaker and sheet metal worker. Four speeds, 60, 90, 250 and 500 feet per minute permit adjustment for cutting anything from the toughest metal at a slow speed, to wood or sheet metal at a high speed.



The frame is cast iron, one piece bolted to cast iron base which in turn may be bolted to the floor. Grease sealed ball bearings are used. Reduction gears include one cast iron helical and one nonmetallic helical gear enclosed in oil retaining gear box. Wheels run in an oil bath. Wheels are cast iron designed to narrow blades for contour work as well as regular ½-inch wood or metal blades. The table is heavy metal plate bolted through structural steel bars to the base.

Cleaner Attachment

Breuer Electric Mfg. Co., 5100 Ravenswood avenue, Chicago, has developed an attachment for use on the portable electric blower when the device is used as a vacuum cleaner. This attachment collects small objects unavoidably drawn into the nozzle, thus preventing bolts, nuts, screws, nails, etc.; form reaching and injuring the suction fan blades. Dust, dirt and lint readily are bypassed into the dust bag. It is claimed the device may be used to collect and salvage small parts or metal particles that otherwise would be unrecoverable. Valuable waste material may be reclaimed from accumulations around benches and machines or during any routine operation of the vacuum cleaner.

"Low Melting Silico-Chrome for Ladle Additions of Chromium"

Ohio Ferro-Alloys Corporation
Canton, Ohio

ADVERTISING PAGES REMOVED

FOUNDRY AND ARMY ORDNANCE

(*Continued from page* 29)

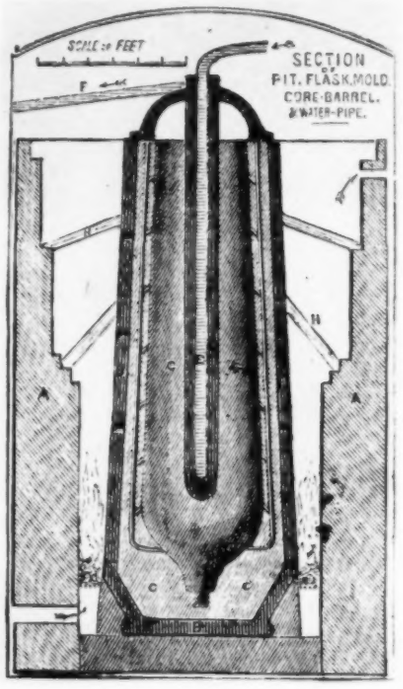
industry or by the government to provide those facilities. It is amazing to us today to think of the lack of steel making facilities which existed only 60 years ago. It is still more amazing when we stop and consider that today we have gone so far as to be the leading steel producing nation in the world.

In the development of steel guns, Col. Rogers Birnie, ordnance department, was a pioneer. Colonel Birnie, who died only a few months ago, was the first officer in this country to apply the principle of built-up guns and to apply modern methods in the construction of ordnance for the government. He corrected the errors in the foreign studies, reconstructed their theories and proved his results. He thus contributed substantially toward placing the construction of ordnance upon a sound basis in this country. The theories developed by Colonel Birnie have not since been improved and the methods and formulas for the regulation of shrinkage as applied to gun construction which he established are in common use today.

Immediate Importance Declined

With the development of built-up steel guns and armor piercing steel projectiles, the immediate importance of the foundry in national defense declined. Many parts of the mounts and carriages for these steel guns are produced in the foundry, but today the built-up gun and steel shell, the fundamental features of the artillery arm, no longer come so directly from the foundry as they did in days of old.

In the World war the foundries were occupied in meeting many requirements for national defense and the foundry industry because of lack of capacity, lack of up-to-date equipment and lack of skilled labor, supplied them with difficulty. Foundry products, such as machine tools, fixtures and other widely diversified items, were required in tremendous tonnage for the huge production program under way. When the call came for shells and more shells, the forging and machining industry could not meet the demands and a considerable quantity of semisteel shells was manufactured to relieve the steel shell shortage. Semisteel shells were used not only to conserve the supply of steel and because of the ease of their production, but in the case of gas shell, on account of the decreased amount of explosive necessary to burst the shell. As the war progressed, requirements for gas shells increased and it was found that with semisteel shells there was less dispersion of the gas, which resulted in better and more effective concentrations of gas. A large and comprehensive program for the manufacture of semisteel shells was developed as it did not interfere with the manufacture of steel shells. In addition to giving better fragmentation for the gas shell and thus having greater effect, the semisteel



Cold water entering core barrel caused cooling from the inside out

shell was machined more easily and could be produced more quickly than the forged steel shell.

During the World war castings were used in gun carriage construction for top and bottom carriages, brackets, etc., for field gun carriages; breech block carriers for guns. In railway artillery castings were used for recoil mechanisms as well as for base ring, racer, car frame, etc. A wide variety of castings was used in track laying tractors and tanks. Cast bronze was used extensively in fuze bodies, bearings, liners, slides, gears, etc.

Cast iron products are used in automotive engines and in some other parts of tanks and combat vehicles but cast iron is little used in gun carriages. Large quantities of cast iron hand grenades were produced during the World war.

Present—Today, the present position of the foundries is very much the same as it was at the beginning of the World war. This is due to the last 10 years of economic depression which has reduced the capacity of the foundries in this country by the scrapping of equipment which has not been replaced. Another factor is neglect of the training of skilled workers. I shall have more to say about that later. Today, however, the foundry industry still plays an important part in almost any type of engineering construction due to the basic character of its product.

The foundry still supplies many of our needs for the enlarged national defense program in the way of cast iron, steel and bronze castings but the increasing number of competitive materials has had a great influence on the foundry industry. Cast iron is essential in the manufacture of machine tools, jigs, fixtures and in the heavier elements of weapons where weight and resistance to shock are not so important. Steel castings are used extensively today in seacoast gun carriages and ordnance where weight is not as great a consideration as it is in field artillery, antitank and antiaircraft artillery.

Use Steel Castings

In the construction of automotive combat vehicles, such as tanks and combat cars, armor plate is used for the protection of the crew and vital parts and mechanisms against small arms bullets, intermediate caliber projectiles and shell fragments. The armor plate, used on flat and built up surfaces, is usually of face hardened plate which has been so fabricated and heat treated that the face exposed to fire has a specially hard and compact texture while the remainder of the plate is strong and tough. In some parts of a tank complicated shapes are required as combined support and protection for irregularly shaped mechanisms, such as transmission cases. In such places homogeneous castings of high alloy steel, which have been given appropriate heat treatment, have qualities that compare favorably with rolled plate. Two firms in Milwaukee have been very successful in producing armor plate castings of that type. They have co-operated with the Rock Island arsenal and the ordnance department in the development of that material and I wish to pay tribute to their perseverance and their success in this difficult field.

Not many years ago field artillery gun carriages were fabricated from riveted plate, steel castings and forgings. Today, the ordnance engineer does not hesitate to build up from tubing, castings, small forgings and plates, complicated major

(*Concluded on page* 81)

(*Concluded from page* 78)

parts of carriages which when tested by magnaflux and x-ray, are known to be more reliable and lighter in weight than steel castings.

In spite of the fact that the designer has made extensive use of welding in this antiaircraft carriage, it still contains almost 10 per cent of steel castings, some of which are built into the welded structure. For example, the cradle consists of a casting containing the trunnion blocks and the apron which is welded to a piece of tubing to form the gun seat. On the bottom is welded a cast steel pad which forms the seat for the recoil cylinders. The whole structure is stiffened by pieces of plate welded in.

The pedestal is for the most part welded from plates, and sheets but it too contains a cast steel piece forming the ball and socket joint for the upper carriage. The pedestals of the first 3-inch antiaircraft mounts were made of steel castings; the outriggers were made of cast aluminum. The pedestals made from steel castings weighed 1899 pounds and compared with a weight of 1583 pounds for the welded pedestals. The designer thus gained 316 pounds by changing to a welded structure.

With high speeding of field artillery carriages, the bronze bushings and bearings used with horse-drawn vehicles have given way to antifriction bearings. However, a number of smaller components such as hand wheels, gears and worms are made from castings.

The concluding installment of the discussion by Colonel Ramsey, which deals with the part the foundry industry is to play in the future, will be presented in the April issue of THE FOUNDRY.

THE EDITORS

Obituary

WALTER A. FORBES, 70, chairman of the board, Gunite Foundries, Inc., Rockford, Ill., died Jan. 26. Mr. Forbes also was a member of the board of directors of the Mattison Machine Co. and was formerly associated with the Rockford Malleable Iron Works.

* * *

Christian J. Gauch, 72, retired foundry worker, died in Belleville, Ill., Jan. 26.

* * *

Roy B. Taylor, 68, foreman of the pattern shop, W. S. Tyler Co., Cleveland, died Jan. 31 in that city.

* * *

Jefferson C. Weisenbach, 44, foundry superintendent, City Foundry Co., Cleveland, died Jan. 19. Mr. Weisenbach had been connected with the City Foundry company for the past 16 years, 10 years as maintenance engineer, and 6 years as superintendent.

* * *

Frank A. Reuther, 76, vice president and treasurer, Reuther Foundry Co., Harrison, N. J., died recently in Newark, N. J.

* * *

James L. Paxton Sr., 77, chairman of the board of the Paxton-Mitchell Co., Omaha, Nebr., died in that city recently.

* * *

Guy V. Fearn, 54, president, J. B. Foote Foundry Co., Fredericktown, O., died suddenly Jan. 26, at his home in that city.

* * *

Col. Arthur F. Townsend, 74, chairman of the board, Raybestos-Manhattan Inc., and general manager of the Manhattan Rubber Mfg. division, Passaic, N. J., died Jan. 14 at his home in Ridgewood, N. J.

* * *

Milton M. Wagner, 77, president and treasurer, Wagner Mfg. Co., Sidney, O., died Jan. 18, at his home in that city. Mr. Wagner's active interest with that company began in 1891, when he became purchasing agent and treasurer. His two sons, Philip G. and John G., both are associated with the Wagner Mfg. Co.

* * *

Edward E. Hughes, 77, formerly vice president, Franklin Steel Co., Franklin, N. J., died recently in West Orange, N. J. Mr. Hughes was president emeritus, Rail Steel Bar association which he founded and served as president for 25 years.

* * *

James Jones, at one time roll superintendent of the South Chicago works, Carnegie-Illinois Steel Corp., died recently in Chicago. Mr. Jones retired from the Carnegie company several years ago and up to the time of his death had been a roll consultant for the Continental Roll & Steel Foundry Co., East Chicago, Ind.

* * *

George A. Gunn, well known in the steel casting industry on the Pacific coast, died in San Francisco recently. Prior to establishing his own offices as a steel casting and forging broker in 1936, Mr. Gunn was associated with Union Iron Works, Columbia Steel Co., and Best Steel Casting Co., later consolidated with General Metals Corp.

* * *

Robert J. Heisserman, sales engineer, Link-Belt Co., died suddenly at his home in Philadelphia, Feb. 9. Mr. Heisserman had been connected with the Link-Belt company for almost 30 years and had been engineer and engineering salesman for foundry conveyors and molding sand preparation equipment throughout the Eastern territory.

* * *

John J. Fasmer, 56, until recently general sales manager, Stephens-Adamson Mfg. Co., Aurora, Ill., died Feb. 3. Mr. Fasmer had been active in the Stephens-Adamson organization since 1901 when he was superintendent of the main factory at Aurora. In 1919 he was appointed manager of the St. Louis sales engineering office and in 1931 was named general sales manager at Aurora.

* * *

Lewis J. Brown, 49, president, International-Stacey Corp., Columbus, O., died recently in a hospital in that city. Mr. Brown was born in Bristol, England, and came to this country in 1907. He was chairman of the board of directors of the International Derrick & Equipment of Texas and of California; chairman of the board of the Roots-Connersville Blower Corp., Connersville, Ind., and chairman and treasurer, Stacey Bros. Gas Construction Co., Cincinnati.

Book Review

Molding and Other Foundry Work, by William Bell, past president Scottish branch, Institute of British Foundrymen; cloth, 124 pages 4¾ x 7¼ inches; published by Chemical Publishing Co. Inc., New York. $1.50.

This book may be regarded as a condensed or abridged version of a description covering the broad general subject of foundry practice as applied particularly to jobbing foundries in Great Britain. In the limited space available the author presents information and instruction in a manner that cannot fail to be of benefit to the apprentice and to the jobbing journeyman whose opportunities for acquiring a technical education were not equal to the opportunities for acquiring the practical tricks of the trade.

The text is supplemented by 10 tables and 71 illustrations. Scope of the work and general arrangement are shown by the following list of chapter headings: Introduction; foundry materials; molding sands, core sand and foundry facings; molding boxes, sling chains and ropes; chaplets and securing cores in molds; venting molds and cores; runners, gates and risers, denseners and feeding, shrinkage and contraction; pressure due to liquid metal in molds; molding, green sand, dry sand, loam and coremaking; cast iron and coke; the cupola; analysis for different classes of castings; mixing metal by analysis, foundry ladles.

ANNOUNCES TENTATIVE PROGRAM

(*Concluded from page* 32)

Continental Roll & Steel Foundry Co.; American Steel Foundries; Allied Steel Casting Co.; Griffin Wheel Co.; Western Electric Co.; Whiting Corp.; National Malleable & Steel Castings Co.; Chicago Malleable Iron Co.; McCormick and tractor plant of International Harvester Co.

The Chicago chapter, in addition to the plant visitation, is also planning an open house and reception for the late afternoon of Tuesday, May 7, at the Palmer house. An extensive schedule of events for the ladies' entertainment is being worked out, including a special program to follow the annual A.F.A. dinner. This dinner program will be developed by the Chicago committee along the lines of the chapter's well known annual Ladies' Night entertainment.

Cover Many Subjects

Apprentice and foreman training, cost methods, pattern making, plant equipment, foundry safety and hygiene, time study, sand research and refractories are subjects to be covered by papers at general foundry interest sessions. In addition, special problems of the malleable, nonferrous, steel and gray iron foundries will be covered in the 40 papers and committee reports to be presented during the week.

An instructional feature of the convention will be the demonstration of crystal formation of metals. Through the use of a microscope projector, Dr. C. W. Mason, Cornell university, will show on a screen, material freezing from the molten to the solid state, illustrating the types of metal formations with which the foundryman deals. Shop courses on sand control and gray iron practice each are scheduled for four sessions. These will deal with the fundamental problems of every day foundry practice.

Some of the technical papers to be presented are as follows:

"Cupola Operation", by Donald J. Reese, International Nickel Co., New York; John Grennan, University of Michigan, Ann Arbor, Mich.; and S. C. Massari, Association of Manufacturers of Chilled Car Wheels, Chicago.

"Cooling and Storage of Foundry Sands", by H. L. McKinnon, C. O. Bartlett & Snow Co., Cleveland.

"Foundry Equipment at Indianapolis Plant, International Harvester Co.", by F. H. Amos, International Harvester Co., Chicago.

"Composite Molding in a Malleable Foundry", by S. Healy, Saginaw Malleable Iron division, General Motors Corp., Saginaw, Mich.

"An Unusual Structure in Malleable Iron", by Enrique Touceda, Malleable Founders' society, Albany, N. Y.

"Pattern Coating Materials", by Frank Cech, Cleveland Trade school, Cleveland.

"Effects of Manganese on Second Stage Graphitization", by D. P. Forbes, Gunite Foundries Corp., Rockford, Ill.

"Heat Treatment of Malleable Iron", by R. J. Cowan, Surface Combustion Corp., Toledo, O.

"Refractories for Cupola Service", by J. A. Bowers, American Cast Iron Pipe Co., Birmingham, Ala.

"Linings for Desulphurizing Ladles", by John Lowe, Vilter Mfg. Co., Milwaukee.

"Flowability of Foundry Sands", by P. E. Kyle, Massachusetts Institute of Technology, Cambridge, Mass.

"Effect of Sand Conditions on Properties of Castings", by H. Womochel, Michigan State college, East Lansing, Mich.

"Application of External Chills to Steel Castings", by W. H. McKee, Key Co., East St. Louis, Ill.

"Application of Controlled Directional Solidification to Large Steel Castings", by J. A. Duma and S. W. Brinson, Norfolk Navy yard, Norfolk, Va.

"Effect of Sulphur on Properties of Electric Furnace Cast Iron", by Fred G. Seiing, International Nickel Co., New York.

"Desulphurizing Cast Iron", by W. Levi, Lynchburg Foundry Co., Lynchburg, Va.

"A Safety Program for Small Foundries", by P. E. Rentschler, Hamilton Foundry & Machine Co., Hamilton, O.

"Damping Capacity, Electrical and Thermal Conductivities and Endurance Properties of Some Gray Irons", by E. C. Kron and C. H. Lorig, Battelle Memorial Institute, Columbus, O.

"Tendency of Cast Irons to Seize under Sliding Friction", by A. H. Dierker, Ohio State university, Columbus, O.

"Formation of Various Types of Graphite Patterns in Gray Cast Iron", by C. D'Amico, University of Detroit, Detroit, and R. Schneidewind, University of Michigan, Ann Arbor, Mich.

"Pearlitic Interval in Gray Iron", by Alfred Boyles, Battelle Memorial institute, Columbus, O.

"Steel Castings and Welding", by John W. Bolton and A. J. Smith, Lunkenheimer Co., Cincinnati.

"A Method of Determining Plasticity", by R. J. McElwee, Vanadium Corp. of America, Detroit, and R. Schneidewind, University of Michigan, Ann Arbor, Mich.

"Cast Iron Cylinder Bores", by E. K. Smith, Electro-Metallurgical Co., Detroit.

Census of Housing

A comprehensive picture of housing and home ownership in the United States will be compiled from information to be gathered in connection with the sixteenth decennial census to be conducted by the United States bureau of census in April. Data, secured in response to a schedule of 31 questions bearing on the type of structure, equipment and ownership, will be obtained for each of the approximately 35,000,000 dwellings throughout the country. This information will be of great value in determining future housing policies and will be of special interest to manufacturers of equipment used in home building.

Book Review

Impact Cleaning, by William A. Rosenberger, cloth, 480 pages, published by the Penton Publishing Co., Cleveland.

Impact cleaning is the term utilized by the author to designate any process in which the abrasive, such as sand, shot and grit, is propelled against the material to be cleaned by any controlled means, including pneumatic, hydraulic, or mechanical. This extensive treatise, written primarily for the buyer and user of impact cleaning equipment, covers in detail the complete range of design, application and operation.

Part I deals with the nozzle blast cleaning equipment, including the sandblast, steamblast and water blast. The discussion of the sandblast includes the direct pressure, gravity feed and suction feed types, and also considers types of abrasives, abrasive reclamation, nozzles and accessories. Much technical information of principles of design and operation of the sandblast is presented.

Part II considers mechanical impact cleaning, where the abrasive is propelled mechanically against the material being cleaned. The author discusses various types of wheels, including batter, slider and vaneless wheels, and then considers practically all of the problems which may be encountered in the application of wheels to impact cleaning. Consideration is given to such factors as maintenanace of equipment, power requirements, abrasive consumption and recovery, troubles and remedies, and the field for impact cleaning. Part III discusses the ventilation problems of impact cleaning.

In general, the book may be considered as highly technical as it contains over 160 formulas for various purposes. However, the practical side of the subject has not been neglected as every day problems in blasting and impact cleaning are discussed.

In preparing the present volume, the author, a consulting engineer, has been guided by his years of practical experience in the design and application of blasting and impact cleaning equipment. His efforts provide a book which should prove of great value to all who design, sell, purchase or use impact cleaning equipment.

The Duquesne Smelting Corp., Pittsburgh, recently has been organized by I. A. Simon, who recently resigned his position as vice president of the Federated Metals division, American Smelting & Refining Co.

INTERNATIONAL MOLDING MACHINES

ARE INDISPENSABLE TO MODERN FOUNDRY PRACTICE. THEY INSURE MAXIMUM OUTPUTS, HIGHEST QUALITY OF CASTINGS AND LOWEST LABOR AND MAINTENANCE COSTS.

14 - Standard types for Cores
65 - Standard types for Castings
Many special types for work of unusual nature

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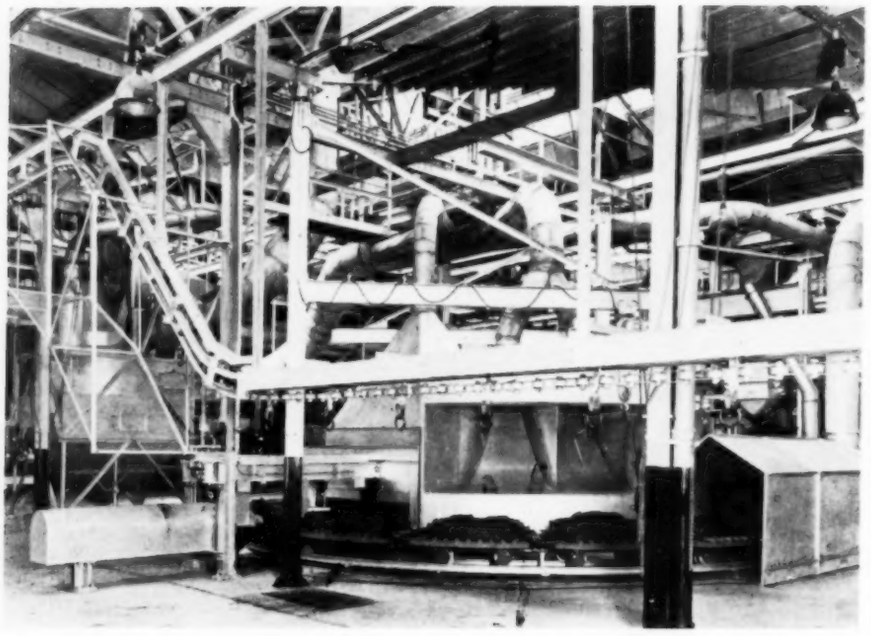

Fig. 23—Shakeout on large units where castings are hung on cooling conveyor, showing large exhaust hood

NEW FOUNDRY BUILDS TRUCK ENGINES

(*Continued from page* 27)

block units are assembled, pasted and blacked as units and then placed in two continuous type vertical ovens for supplementary drying of the paste and blacking. The cores are entered at one side and are placed on a series of swinging shelves which carry them aloft and bring them down on the opposite side. On the journey upward the cores pass through zones of increasingly higher temperature to a maximum of 500 degrees Fahr. On the journey downward the process is reversed and the cores are delivered in condition to be handled readily.

Crankcase and other large cores are parked first on a series of short transverse roller conveyors mounted on supports 30 inches above the floor. A transfer car made up of a short section of conveyor mounted on a frame with wheels on the bottom and a turntable on the top, is employed to carry the cores either to the short conveyor sections, or to the main conveyor leading to the molding units. At a point where the conveyor crosses a wide transverse gangway, a section about 20 feet in length is hinged at one end and mounted at the other end on an inverted *A* support resting in turn on a small truck with two wheels in tandem as shown in Fig. 15. This section readily can be swung either right or left for the passage of trucks loaded with a wide variety of materials.

Two main conveyors from the core room merge into branches which extend along the main right and left gangways to the heavy molding units. The branches are connected by a lateral member at the closed end to facilitate if necessary the exchange of cores from either of the ovens to meet any change in production schedule on either of the molding units. The arrangement is largely precautionary since the contingency under ordinary operating conditions is somewhat remote. General layout of the foundry showing the approximate location of the various departments, but not drawn to scale is shown in Fig. 22.

Each Unit Is Self Contained

Two molding units designed for the production of the heavier castings, cylinder blocks, and truck wheels, are located approximately in the center of the building. Each unit is completely self contained with independent sand supply. A description of one will serve for both. Sand from the shakeouts is carried by a belt under the floor to the foot of a bucket elevator which carries it aloft where it is cooled, aerated and screened and delivered to a storage tower. In measured amounts it is passed through a muller type mixer and then delivered to a belt which feeds two sandslingers on the floor. Constant check is kept on the sand to maintain the desired permeability, green bond strength and moisture content. A typical test shows permeability 70, green strength 2, moisture content 5 per cent, sea coal 10 per cent, and grain size 80 mesh. Air suction removes the fines at the shakeout station and the necessary additions of new sand, clay, cereal binder or sea coal are made in the mullers on the upper floor.

An oval conveyor 130 feet in length serves the unit on which molds for cylinder blocks and truck wheels are made under two sandslingers, one for the drags and one for the copes. Two short lengths of roller conveyors, one opposite the pouring station and the other near the shakeout station at the south end, bring the empty flasks to the molding stations. Pattern equipment for the castings is set up on a revolving ground level turntable which brings each pattern in turn under the machine where a stream of sand from the swinging head is directed practically without interruption from one flask to the next. In this manner the machine is kept in constant operation. A small hoist suspended from a length of I-beam places the empty flasks in turn on the pattern plates. A similar crane on the opposite side of the unit lifts the rammed half molds and places them on the conveyor.

In accordance with modern automotive foundry practice the drag flasks are barred to hold the sand instead of utilizing the usual bottom boards or plates. Transverse ribs on the conveyor pallets support the flasks and provide intermediate space for a layer of loose sand on the pallets which serves as a cushion and protection on the comparatively few occasions when a little hot metal splashes over the edge of the runner basin.

Molds Are Skin Dried

Immediately after the drag of each mold is placed on the conveyor the mold face is sprayed with a thin mixture of liquid blacking. Then the mold passes an attendant who manipulates the flame of a large swinging torch to dry the blacking and impart a slight skin drying effect to the sand immediately below the blacking. The treatment is light and sketchy compared with ordinary skin drying technique, since the flame plays over the surface for only about 20 seconds, but it is adequate in this instance where the mold is filled with iron a few minutes after the surface is skin dried. The time interval is not sufficient for moisture in the underlying sand to work through the skin dried surface.

The entire set of cores for a cylinder block is assembled in a jig, picked up by a small hoist and lowered into the drag as a unit. The jig is a highly complicated, highly ingenious and highly accurate piece of equipment. Not the least interesting feature is the release mechan-

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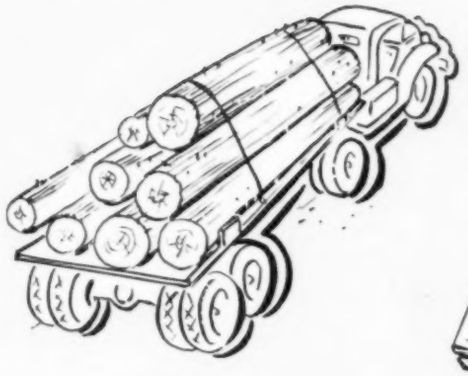
★ WOOD ★ PAPER ★ RAYON



YET ON A PRACTICAL BASIS *All* ARE CELLULOSE

IN PIG IRON, TOO,

THERE'S A VAST DIFFERENCE

It is not merely chemical analysis but *physical structure* which determines the value of pig iron.

MELTRITE

is used *exclusively* in scores of foundries, and is the *dominant* pig iron in hundreds of others.

MELTRITE
THE SUPERIOR PIG IRON

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(*Concluded from page* 84)

ism which disengages the lifting fingers when the core is seated.

The cope is not skin dried, but is placed directly on the drag while that portion of the mold is passing the cope molding station. Molds are poured immediately after they are closed and then pass through a hooded section of the conveyor where steam and smoke are exhausted by one of the many units provided at various parts of the foundry for this purpose. A short distance further along the copes are lifted, shaken out and returned to the molding station. At the south end of the conveyor the castings are lifted, attached to aerial conveyor hooks and started on a 6-hour journey which closes at the continuous pressure blast chamber and the chipping and grinding benches. The drags are shaken out and returned to the molding station to complete the cycle.

This is the second article in a series of three dealing with many of the general and detail features of a gray iron foundry recently placed in operation in Indianapolis, Ind., by the International Harvester Co. The first article appeared in the January, 1940, issue of THE FOUNDRY and the third will appear in an early issue.

THE EDITORS.

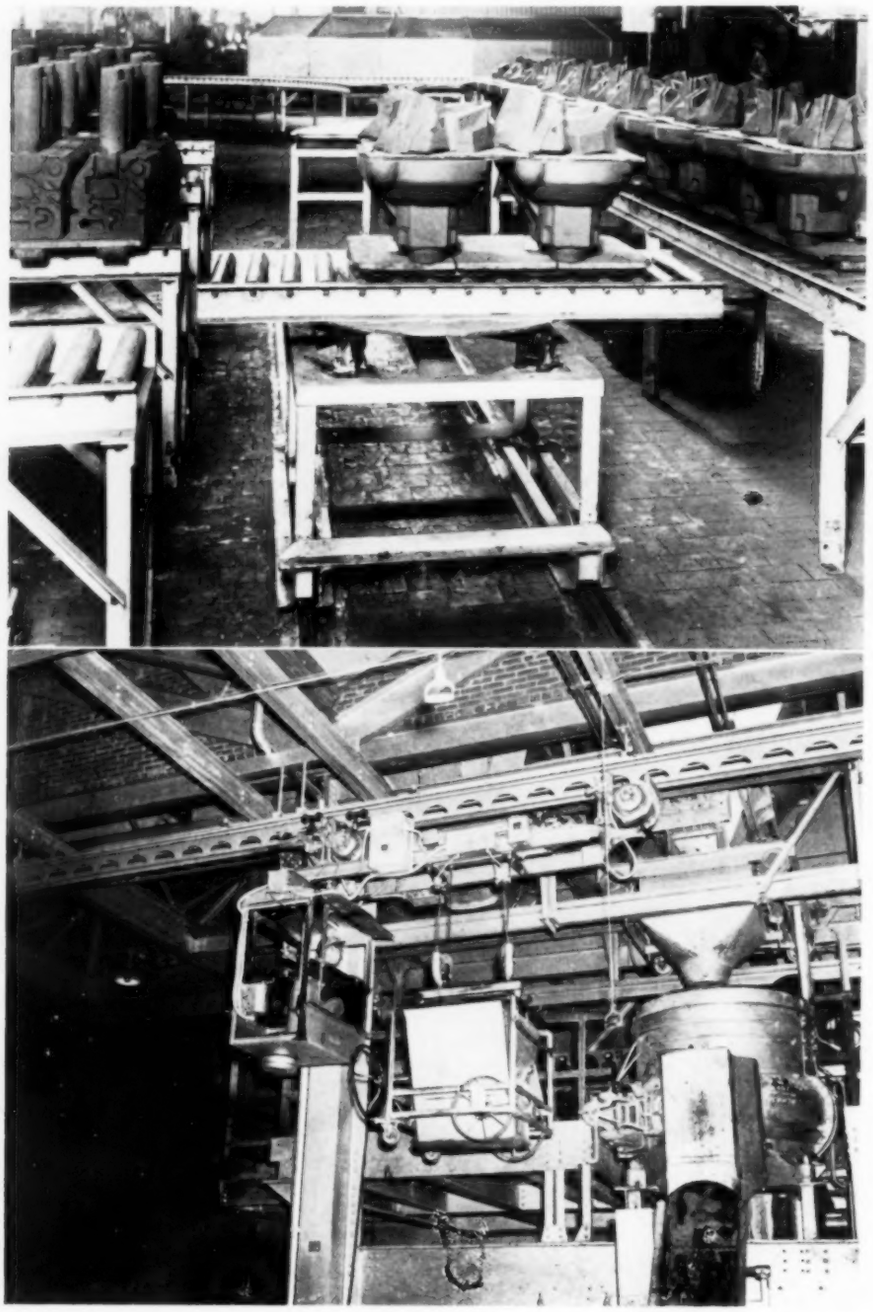

Fig. 24 (Above)—Roller table transfer enables convenient transfer of cores from main conveyor to storage on spur section. Fig. 25 (Below)—Overhead core sand conveyors transport sand from mixers to benches and machines. Muller type mixer in background

Book Review

A History of the Growth of the Steam-Engine, by Robert H. Thurston, cloth, 555 pages, published by the Cornell University Press, Ithaca, N. Y., for $3.00.

This is the centennial edition of Thurston's famous work, which first appeared in 1878 and passed through six editions, the last in 1907. The special edition was prepared for the special celebration of the one hundredth anniversary of the birth of Mr. Thurston, which was held at Cornell university on Oct. 25, 1939.

While later books have been written on the subject by other authors, Thurston's presentation is considered a classic by many. Publication of this edition, since few copies of previous editions are available, should be welcomed by all who have an interest in the design, manufacture or use of the steam engine.

To bring the history up to the present, a chapter, "Brief Supplementary History of Steam Power Engineering from 1870 to 1939," by W. N. Barnard, has been added.

Fig. 26—Large sand storage bin showing clamshell bucket operated from overhead crane

Moves Plant

Fisher Furnace Co., recently has moved to new and better adapted headquarters at 1740 North Kolmar avenue, Chicago.

Refractory Products Co., 219 East North Water street, Chicago, has been appointed representative of the Ajax Metal Co., Philadelphia, for the sale of nonferrous alloys in ingot form in the Chicago and Midwest territories. E. W. Woodruff, will be in charge.

COMMENTS OF FOUNDRYMEN REVEAL PROGRESS

(*Continued from page* 31)

strength gray iron castings is increasing and is being met effectively by better metallurgical practice and improved equipment for melting and refining. Duplexing is gaining in popularity, as a means of producing different grades of iron from a primary mixture. Designs are in preparation of small capacity fuel fired furnaces to meet the growing needs in this field.

Water-jacketing of cupolas to permit longer periods of operation with less change in diameter and area in melting zone has had measurable success and promises to become of more general benefit to cupola operators with further development and perfecting of design and construction. Reduced cost of refractories has been established as a proved advantage.

In the production of steel castings, the bessemer converter of side blow type is receiving favorable consideration in many foundries because of low investment cost, low standby expense and flexibility of operation. This unit bids fair to regain lost prestige because of inherent merit for a high quality product.

Sand reclamation has advanced, especially for the steel foundries where both cleaning by washing and classification by grain size has been advanced through the use of the vacuum filter in which sand first is dewatered after washing and then dried to suitable moisture content by application of heat.

High pressure water cleaning of large castings, both steel and gray iron, has been advanced appreciably during the year through developments in the better mixing of sand in the water stream and perfection of the gun for use at higher pressures. Barrel cleaning with high pressure water and sand is being developed and promises to benefit the industry through dustless cleaning facilities.

In the malleable foundry field mechanized molding has seen real progress during 1939, bringing with it duplexing of metal as the only logical means of providing continuous supply of metal within the carbon range required for high quality malleable iron.

There is at present no single melting unit which will provide continuous output of metal below the practicable low limit of carbon of the cupola, which may be stated as within an approximate range of 2.50 to 2.70 per cent. Much work has been done and is being done to provide a melting unit to meet this world need.

There is not yet a solution of the malleable annealing problem which is to provide a cycle of reasonable length such as 72 to 96 hours for the standard analysis to produce a high quality product required by the A.S.T.M. specification. Progress is being made toward this accomplishment having in mind the desirable factors of reduction or elimination of packing materials, reduction in weight and cost of containers, with the consequent reduction in labor from the above and the use of the low cost universal fuel—coal.

Better Business Prevailed In Gray Iron Field

By W. L. SEELBACH
Secretary and Treasurer
Forest City Foundries Co., Cleveland

THE most important development during the year 1939 was the fact that, as a whole, better business prevailed in the gray iron foundries, and better profits were made. These foundries were able to bring their production equipment up to standard and were able to buy additional equipment.

During 1939 there was a general advancement in knowledge of foundry irons and there was better application of foundry irons to the products for which they were used.

One of the future developments that should be of interest to all gray iron foundrymen is the work that is being done by associations and individuals on cupola operation.

Foundryman Must Be a Keen And Skilled Consultant

By W. D. HAMERSTADT
President
National Founders' Association

WE ALL are aware of inroads that stampings, plastics and welded steel are making on castings volume. If these are cheaper and better than castings, such inroads are to be expected. Too often, though, foundry business is being lost by default. Can a casting be made thinner and lighter and still be strong enough for the purpose intended? Will more care in molding and cleaning improve appearance and save needless time in finishing? What about finishing technique? Can the shape or design of a casting be changed with resulting saving in machine work or molding time? Can one casting be made to combine the functions of two with resulting reduction of cost?

These are the things competition discusses when castings are being replaced. The successful foundryman must become a keen and skillful consultant in the use of castings—he should be able intelligently to help his customers improve their products and lower their costs.

Of course, research and investigation are needed to make better castings. And the manufacturers of foundry equipment should give more attention to providing equipment suited to the small general type of foundry to give it advantages now enjoyed only by the larger shops. Finally the individual foundryman must determine the success of his industry in 1940. It depends on how well he makes use of advancements already available. Other businesses find it necessary and profitable to keep ahead of their competitors and certainly the castings industry can be no exception.

Steel Castings Interest Is In Many Developments

By C. W. BRIGGS
Technical Advisor
Steel Founders' Society of America, Cleveland

DURING the year 1939 the steel casting industry has shown considerable interest in technical and operating developments. This has resulted largely from the collective study given to these problems by the key operating men of the industry during monthly group conferences under the auspices of the Steel Founders' society. Important studies on such subjects as steel melting practice, slag control, sands, chills and chaplets, cleaning room practices, safety and hygiene and many other operating and technical problems have been considered carefully.

Progress has been made in the adoption of radiography as a means of nondestructive inspection throughout the industry. Radiography is being used as a tool in obtaining better production methods as well as a means of final inspection. During the year a number of steel casting organizations have taken up use of radiography in a routine manner.

An important advancement during the year is the increase in the use of cast-weld construction. Designers are beginning to recognize the importance of welding castings to castings, or steel castings to wrought steel in an effort to reduce the cost of an all welded fabrication. Also complicated castings that are most difficult to produce integrally are being considered from the standpoint of manufacturing

them in readily castable parts and assembling the composite structure by welding.

The amount of interest shown in cast-weld construction, of course, depends to a large extent upon the designer. However, considerable cooperation has been effected during the past year between the foundryman and the designing engineer to take advantage of the recent trends and developments.

Considerable thought and study have been given throughout the year to steelmaking practices. Steel castings companies have studied the subject individually and the Steel Founders' society, the American Foundrymen's association and the Melter's guild have studied it as groups, either through symposiums or by correlated questionnaires and prepared papers.

Progress is being made in all production operations of the steel foundry. The dual objective of every management appears to be the production of a better product with maximum efficiency.

Safety and Mechanization Receive Consideration

By P. J. POTTER
President
Foundry Equipment Manufacturers' Association

THERE seems to be two outstanding developments over the past year. They are:

(1) Determination of foundry operators to make their plants safe places in which to work. All operations are studied from the safety viewpoint, and all new equipment must be safe, both from an accident and dust standpoint. The foundry industry is spending large sums of money and is giving careful thought to safety, and vigorous campaigns are waged constantly among employes in the industry to make safety the first aim.

(2) Rapid mechanization of all foundry operations; sand preparing, automatic cupola charging, machine core making, machine molding, and automatic cleaning of castings. All of the processes were developed over the past years but constantly are being expanded and enlarged to meet increased production schedules. On the other hand, the various units are now built in smaller sizes at a price within reach of the smaller foundries.

Lack of trained foundry help, wage and hour law, insistence of casting buyers for better and more uniform castings and quick deliveries are all pressing the foundry into more mechanization of operations.

Foundry equipment manufacturers are meeting their obligations to the foundry industry with a 100 per cent determination to assist in making foundries safer places to work, and to aid producing better castings, and lowering costs.

Must Watch Obligation for Quality and Service

By MARSHALL POST
Vice President and Works Manager
Birdsboro Steel Foundry & Machine Co.
Birdsboro, Pa.

THE healthier condition prevailing in business at the moment, with its insistent demands for preferred deliveries, entails a rapid expansion of staff and personnel and places a greater strain on keymen and equipment. Management must, therefore, be ever watchful of its obligation for quality and service as well as for quantity.

Care Must Be Exercised in Specification Writing

By HARRY A. SCHWARTZ
Manager of Research
National Malleable & Steel Castings Co., Cleveland

VOLUME of malleable production in the United States being in considerable part dependent upon automotive construction, took somewhat the same course as did the building of automobiles during the past year. From the viewpoint of tonnage the year was therefore an improvement over its predecessor.

Committee A-7 of the A. S. T. M. made somewhat definite progress by advancing the tentative specification for cupola malleable to standard. This action now fully recognizes cupola malleable as a suitable material for those purposes for which it has long been in use, most notably pipe fittings. This action seems to be in line with established engineering opinion. The committee also submitted a tentative standard which was adopted by the society covering pearlitic malleable. The intent of this specification was only to cover so far as means of identifying the properties of a material and of outlining the methods of acceptance testing and so on, which were to be applicable to the product. So far as possible these were made consistent with the other malleable specifications.

There is justifiable comment to the effect that the specification would be better if it outlined specific properties; unfortunately this does not seem to be advantageous in the present state of the art. A considerable number of specialized pearlitic malleables have been produced by varying methods and of varying properties. Each of these was made by one or at most a few producers to meet the demands of particular buyers. There is certainly, as yet, no body of experience justifying the exclusion of these materials nor indeed have the possibilities been so far explored as to make it possible to predict precisely what combinations or properties can be had and which are most useful for various purposes. It would appear that this specification would have to stand as tentative for a considerable length of time until the consuming and producing industries find what materials are desirable and what are not.

The situation is rendered more difficult by the fact that certain particular operations are patented and certain other details are regarded as trade secrets so that a specification writing body lacks much published information which would be of use to it. In this connection it may be well to comment on the confusion which arises due to the improper use of statistical data as a basis for specification making. Everyone recognizes that no commercial material can be made to conform rigidly to an exact specification; some tolerance must be permitted and this tolerance is a function of the manufacturing process and the precision of its control. There remains always, however, a tolerance of some magnitude to be reckoned with.

When we speak in general terms of the properties of a product, we generally are content to take the average properties of a considerable number of tests. This value is the expected or most probable or modal value. There is a great tendency even among people who should know better, to regard this value as that to be used for a specification. If it is so used, then approximately one-half the material made will be rejected which is obviously an economical impossibility. If the material is to be an article of commerce, then it is necessary that the specified value represent a figure which will always be exceeded in good operating practice. It might be more exact to say which will fail to be exceeded only in an extremely small proportion of the total cases. How far the specified value must be below the average is then a question to be determined by the possible precision of control without prohibitive cost which the plant can exercise. If the value so specified is too low to meet the requirements of the user, then the material has no place in the economic scheme of things.

If the producer permits himself

(*Concluded on page* 92)

NORTON SERVICE
..CONSULTING ENGINEERING in the Foundry
OPERATION Snagging
PART Castings
MATERIAL Cast Iron
REMOVAL Varies
LIMITS
REMARKS This wheel cut freely with a minimum of dressing. Life good.
WHEEL 3714/3-RB
SIZE 24 x 2 x 2½"
MACHINE Floor Stand
WHEEL SPEED 6000 s.f.p.m.
OPERATION Snagging
PART Forgings and billets
MATERIAL Carbon & Alloy Steel
REMOVAL Variable
LIMITS
REMARKS Wheels were judged by hours of life, operators reaction and rate of production.
Wheel
Norton
Competitor's
Wheel Life in Hours
24
8
WHEEL 14/2-QGT-H Resinoid
SIZE 18 x 2 x 7"
MACHINE Swing Frame
WHEEL SPEED
OPERATION Snagging
PART Plow Parts
MATERIAL Chilled Iron
REMOVAL Varies
LIMITS
REMARKS Very satisfactory specification.
WHEEL 3720/2-S
SIZE 18 x 2 x 1½"
MACHINE Floor Stand
WHEEL SPEED
OPERATION Snagging
PART Castings
MATERIAL Hard Malleable Iron
REMOVAL
LIMITS
REMARKS Ground 17½ tons of castings per wheel against competitor's average of 14. Wheel life 51-2/3 hrs. against 40 for competing wheel.
WHEEL 16/2-R4T-H
SIZE 20 x 1½ x 10"
MACHINE Floor Stand
WHEEL SPEED 1800 r.p.m.
OPERATION Snagging
PART Bath tubs, enamel ware
MATERIAL Cast Iron
REMOVAL Varies
LIMITS
REMARKS Best wheel ever used on this operation.
WHEEL 3714/3-S3T-H
SIZE 6 x 2½ x 2½"
MACHINE Portable
WHEEL SPEED
OPERATION Snagging
PART Misc. Castings
MATERIAL Malleable Iron
REMOVAL Varies
LIMITS
REMARKS Equal in every way to competitive resinoid bonded product. Life and cutting action comparable and in addition there is the price advantage of vitrified over resinoid.
WHEEL 1514-Q5
SIZE 24 x 2 x 2"
MACHINE Floor Stand
WHEEL SPEED
OPERATION Cutting-off
PART Castings
MATERIAL Bronze, Aluminum & Monel
REMOVAL 4 to 5% cross section
LIMITS
REMARKS Best wheel ever used -- looks as if wheel life would be double that of competitor's.
WHEEL 16/6-S2R
SIZE 14 x 1/8 x 1"
MACHINE Tabor
WHEEL SPEED 3800 r.p.m.
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(*Concluded from page 90*)

to be carried away by advertising enthusiasm and claims by implication that the average value might be used as a means of specification or if, as sometimes happens, he sets out without proper caution the best values he has obtained, then he cannot hope to produce at a profit material up to his advertised values. Yet he has given the user good ground to believe that he may consider the advertised values as a basis of specification.

The discussion here set forth has no more application to pearlitic malleable than to any other material. It does, however, happen to be a fact that there has not yet accumulated as public property a sufficient amount of test data in this field to permit outside engineers to arrive at any opinion as to the probable degree of scatter which might be used in connection with average values to set up a useful specification.

Somewhat similar considerations affect the problem of quick annealing in the malleable industry. The question is not so much how fast the job can be done under the most favorable conditions as how often a particular process failed to give results when controlled as well as is economically feasible in production. The problem of short annealing time has always had dramatic appeal; the economy appeal is not so great. Contrary to the opinion of many consumers, annealing cost does not go down as annealing time is decreased. The reason for this is that in any event the stock must be heated. Maintaining it at a temperature in a well insulated furnace is a rather economical process.

Overhead Is Expensive

Decrease in annealing time is in general accomplished by changes in furnace construction involving a very considerable cost of mechanism and of scaling resistant parts whose depreciation rate is relatively high. It therefore is rather easy to eat up in overheads much more than the fuel saving accomplished by the short heat treatments. Unless and until a consumer actually is willing to pay more money for a saving in time, the reduction of annealing time to the lowest possible limits will not be economically attractive. The cheapest annealing time of course varies with individual plant conditions. It is certainly not the longest annealing time, such as a week or 10 days, which was formerly common, but neither is it one of the extremely short times now occasionally discussed of say 30 hours or under.

In view of the fact that almost every metallurgical variable affects the annealing of malleable iron, it must be borne in mind that if one must run close to the minimum of annealing time, all of these variables must be kept close to the optimum conditions. Occasionally these optimum conditions are not the most economical conditions and furthermore accurate supervision also involves additional expense. The fact that the optimum annealing time may represent far from the optimum physical properties is another factor. Except in special cases therefore, it is not to the interest of the user or the producer of malleable iron to strive for the fastest annealing but only for the elimination of unnecessary waste of time.

Study Ways and Means of Improving Product

By ENRIQUE TOUCEDA
Consulting Engineer
Malleable Founders' Society

THERE has been no outstanding metallurgical development in the manufacture of malleable iron during 1939.

In connection with metallurgical equipment there has been a slight increase in the installation of batch and continuous annealing ovens with controlled atmosphere. One more foundry has installed the duplexing system, which admits of continuous pouring, the details of which process have been improved with each additional installation.

A considerable number of experiments have been conducted by some of the foundries in the direction of special products in which the property of wear resistance has been increased. In this connection, it might interest the reader to know that a product can now be made uniformly and constantly by some of the foundries that will run around 64,000 ultimate strength; 49,000 yield point, and 20 per cent elongation with no decrease in machining properties over the ordinary type of malleable iron.

In connection with the continued effort to improve the product in respect to both uniformity and toughness, and recognizing the fact that the better the metallurgical background of the key and assistant key men of the operating force in the foundry, the more efficiently should melting, annealing, and molding operations be conducted, an arrangement was made last summer by the Malleable Founders' society with the Rensselaer Polytechnic institute, Troy, N. Y., to give some 20 of these men an intensive 8 weeks' course in general metallurgy and metallography, a policy that possibly may be followed each year from time to time as the men can be spared.

During the course, the manufacture of pig iron was first reviewed, following which the various steel, wrought iron, electric furnace, gray and malleable iron processes were studied, and in between, practical courses in metallography, heat-treatment, molding and molding-sand testing were introduced.

It is the intention of the Malleable Founders' society to avail themselves of every practical opportunity by which they can improve their technical organization and equipment.

Nonferrous Foundrymen Are Increasing Control

By N. K. B. PATCH
Secretary
Lumen Bearing Co., Buffalo

ALMOST all industries have suffered from the lack of replacement or proper repair of equipment during the depression years items. The nonferrous industry has been no exception, but it now is adopting the best available types. The industry also is adding to its personnel those who are able to bring increased experience and the right kind of background to insure an improvement in the product where improvement is possible. Many foundries that in the past have not recognized the value of metallurgical or chemical control today are convinced of its absolute necessity. Many others who have been using technical control more or less indifferently, now are learning how to use it effectively.

Consequently, I believe the average quality of the nonferrous castings to be produced in the future will be of a much higher order than was the same average heretofore. Those who have been straining to make a high quality product still are improving their quality so that they will maintain their leadership in spite of the improved average. These leaders have held their position by avoiding neglect of equipment and personnel and by the constant use of intelligent research and sound judgment and the application of the products of such research. These leaders now being more earnestly followed by a larger number of those constituting the industry itself.

Pittsburgh district sales office of the Vanadium Corp. of America has been moved from the Bridgeville, Pa., plant to the Henry W. Oliver building, Pittsburgh. G. F. Fritschi is Pittsburgh district manager of sales.

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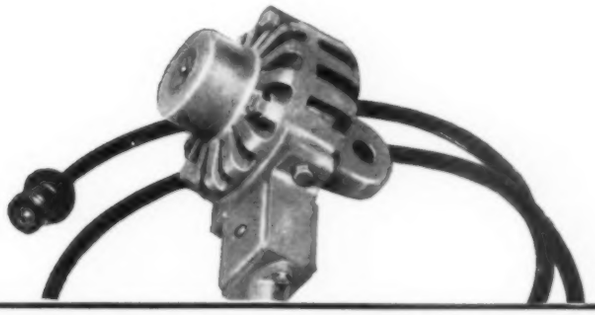

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FUNDAMENTALS OF CORE BLOWING

(*Continued from page* 36)

that the core prints will extend through the core box wall to permit nails or rods to be inserted through the prints after the core has been blown and before removal from the core box. In cases where the core is blown through the print, the blow plate, of course, seals off the opening through the core box walls. Where this is not the case, the core box must be arranged so that these openings are sealed off by the clamp jaws, table wearing plate, or some similar means.

In using wires on small or simple cores, it is possible to place the formed wire in the core box cavity, and the whipping action of the sand will pick up and embed the wire in the body of the core. On more difficult jobs it is quite common practice to bed the wire with a handful of sand in the lower half of the core box before the box is closed preparatory to placing it in the machine. When rods are to be blown in the body of the core they may be bedded in the lower half of the box with a handful of sand, as just described, or in extreme cases supporting posts are built in the lower half of the box to support the rods. When these posts are used there will be a corresponding opening in the finished core which will have to be filled and patched after the core has been baked. Whenever possible an attempt is made to place these posts on core prints, which eliminates the necessity for patching.

Grain Sizes Arranged

Another characteristic of a blown core is that the finer sand grains arrange themselves at the outside of the core with the larger sand grains in the center. Consequently a core produced by the blowing method will have a skin of maximum smoothness and at the same time, due to the location of the larger grains in the center, will produce a core of maximum permeability. Since such cores are more open than hand rammed cores, they do not require as many gas vents. However, on large chunky cores, it sometimes is desirable to use vent rods. The vent rods may be built into the core box equipment in such a manner that they may be withdrawn after the core has been blown and before it is transferred to the drier.

A comprehensive example of core box rigging for blowing purposes is shown in Figs. 13 and 14. Fig. 13 shows a motor end bearing core, a relatively simple core to blow. It is blown through a single blow hole located in the upper print. The core box has a vertical parting line, horizontal clamps being used on the machine. Box vents required are of the groove type strategically located around the parting joint of the box. The core box cavity fills readily and the cores are transferred to horizontal driers.

Fig. 14 shows an automotive barrel and crank case core, which is the more complicated class requiring a series of blowing holes. A carefully balanced venting arrangement has been worked out, involving several types of vents to influence the blowing stream in such a manner that the core box cavity will fill properly and the core come full and hard on the shoulders. Reinforcing rods must be blown in position in the body of the core, and removable vent rods are used to provide additional passage for pouring gases. This core is dried on a drying plate with loose support piece under the barrel end. Both of the cores illustrated are jobs and representative of the diversified requirements which must be met in rigging different types of cores for blowing purposes.

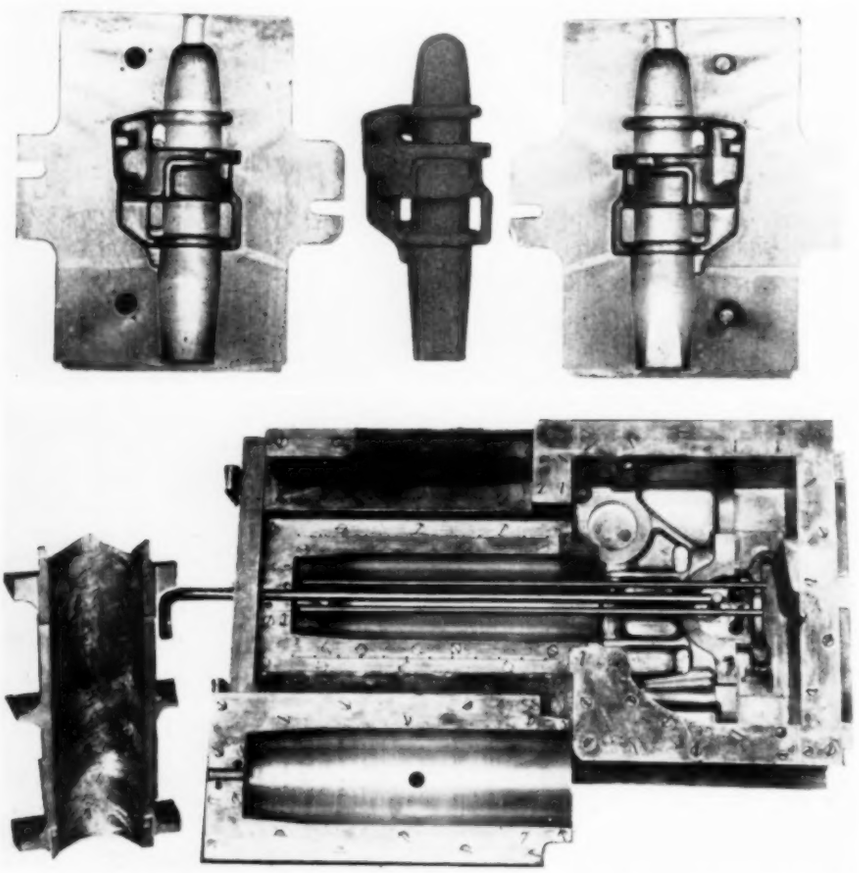


Fig. 13 (Above)—Corebox prepared for blowing motor end bearing core. Fig. 14 (Below)—Corebox prepared for blowing automotive barrel and crankcase core

Advantages Are Cited

We now come to the oft asked and very pertinent question—Under what conditions can a core blowing machine be operated to advantage. The obvious answer is that it is practical to operate a core blower under any conditions whereby a saving in ultimate cost of production can be made. Operating conditions, type of work, and production requirements are the governing factors and these factors vary widely in different plants. There can be no fixed set of limitations. However, the following facts should be helpful in analyzing any individual situation.

Relative Factors Governing a Core Blowing Machine Operation: The pneumatic core blowing machine is intended for producing small and medium size cores in commercial quantities and is primarily a production machine. Satisfactory operation requires first-class material core box equipment and should be confined to conditions where the cost of such equipment is justified and where the required sand mixture is free from heavy bond and

(*Continued on page* 97)

(*Continued from page* 94)

of sufficient flowability to work freely in the machine.

Each individual core job must have, in addition to a suitable metal core box, its complement of metal driers (when not suitable to stand on a drying plate), and a blow plate with the blow holes arranged to conform to the core box. When changing from one job to another it is necessary to change the blow plate, readjust the machine so that the core box height, clamps, etc. will conform to the new job, and in cases where a different sand mix is required, clean out the reservoir and sand hopper to receive the new mixture.

A core blowing machine, under proper conditions, will complete the full operating cycle and deliver a blown core in the core box on the machine in from 3.5 seconds for the smaller machines up to approximately 6.5 seconds on the larger machines. The additional time required to remove the core to the drier and get a box back into the core blower for the next blow, completes the production cycle and is dependent upon the facilities available, the operator's skill, etc. As is the case with any piece of production equipment, it therefore is desirable that the production cycle, approach as closely as possible the ultimate machine cycle, or in other words, that the machine be kept operating as continuously as possible.

Follow Operating Cycle

To accomplish this, it is quite common practice to serve a core blowing machine with sufficient duplicate core boxes and such additional man power as is required to balance the production cycle so that full advantage can be taken of the operating cycle of the machine. Sometimes this may mean one operator with two duplicate core boxes, sometimes it may mean several men and several duplicate core boxes, depending upon the amount of time and work involved in removing the blown core box from the machine, drawing the upper half of the core box, handling loose pieces, applying the drier or drying plate, rolling over the low half of the core box and transferring the core to the drier or drying plate, cleaning and closing the box, and getting an empty core box back into the machine for the next blow.

In addition, certain jobs may require special treatment such as placing oil on the prints, or other hand work pertinent to that particular core. In the last operation the loaded driers must be placed on the drying racks.

The normal function of the core blowing machine itself is to fill the core box. When it is realized that a machine, even of the larger sizes, will complete the machine cycle and fill a core box in not exceeding a maximum of approximately 6.5 seconds, it is an important part of the total operation that adequate means be provided to serve the machnie with empty core boxes at a speed commensurate with the ability of the machine to produce the cores.

To accomplish the related handling operations in the shortest possible time and maintain a smooth and constant flow of the core boxes back to the machine, many mechanical means are employed to facilitate the work. Core box drawing machines of the stripper type, or of the rollover and draw type may be used, as the case may require, for removing the blown core from the core box. The machine table may be equipped with rollers to facilitate the handling of large or heavy boxes in and out of the machine.

Use Handling Equipment

Conveyor loops or turntables provide a series of progressive individual operating stations with the auxiliary handling equipment always adjacent. Fig. 12 illustrates a core blower of the larger size installed with a conveyor loop. A core box drawing machine is situated in the conveyor loop for removing the core from the core box, and ample room and accessibility is available around the loop for such other working stations as may be required. Fig. 8 shows a similar machine installed in connection with a special turntable. This turntable provides individual working stations including a rollover and draw mechanism. The sequence of work is arranged and so timed that a fresh core box is delivered to the machine operator in step with the machine cycle. To further assist the operator, rollers are provided on the machine table. These rollers not only facilitate the handling of the box into and out of the machine, but also materially reduce frictional wear on both the core box and the machine table parts.

Another important mechanical help in connection with the operation of a core blowing machine is the mechanical draw feature which is built into a machine of that type. Machines having that feature are provided with a draw cylinder built into the base, and the machine table is supported by the corresponding draw piston. In lieu of the usual vertical clamp diaphragm, the vertical clamp action is accomplished by introducing air into the draw cylinder, thus raising the machine table and core box against the blow plate to obtain the necessary seal. The purpose of this arrangement is to provide automatic means of drawing the core on the return stroke of the draw piston and table.

It readily will be seen that, operating in this manner with an open face core requiring only a half box, it is possible to attach the half core box to the reservoir unit permanently and deliver the blown core directly on the core plate by the downward travel of the draw piston. Also, when using a two-part core box the upper half may be attached permanently to the reservoir and automatically drawn on the down stroke, leaving the core on the lower half of the box and thus saving one operation, that of removing the upper half of the box.

Must Consider Factors

However, use of the core blowing machines having that type of draw feature is not universally advantageous. Among other factors which should be considered is the loss of speed and the increased air consumption. As it is necessary to fill the draw cylinder each time the table is raised to clamp, and the draw piston and table must travel up a distance at least equal to the return downward stroke, it is obvious that both speed and air displaced are effected materially as compared with a conventional machine using a vertical clamp diaphragm. On some designs that additional volume of air is offset somewhat by the use of hydraulic mediums. On many jobs the core box can be removed from the machine and drawn by other means faster and with greater economy. Use of core blowing machines with the draw feature should be confined to such jobs as lend themselves to that particular type of operation.

In view of the characteristics and general nature of a core blowing operation, it again is unnecessary to suggest that a core blowing machine is basically a piece of production equipment. Just how far these basic production characteristics can be modified and applied to miscellaneous and short-run jobs is dependent entirely upon individual conditions. The major consideration is whether or not the job will justify the cost of the equipment and the time required to change blow plates and readjust the machine. In a number of cases where several different jobs are run with the same sand mix, considerable ingenuity has been shown in working out methods for changing blow plates quickly without dropping the sand from the reservoir.

In other cases a careful study of the jobs may show that it is possible to arrange the blow holes so that several different core boxes can be blown from the same blow

plate. This is accomplished by laying out the blow holes so that certain core boxes will seal off certain holes while utilizing others. In the case of an unusually difficult core having small and intricate passages and contours which cannot be rammed satisfactorily by hand, it may be well worth while to provide core box equipment and change sand, blow plate, and machine setup for even a comparatively short run of satisfactory cores.

In concluding, it again is emphasized that each individual core should be made a study in itself. No two core jobs are exactly alike and the wide variation in requirements and operating conditions precludes any attempt upon the part of the author to suggest a universal procedure which will apply to the blowing of all cores. It is hoped, however, that the foregoing comments will prove of helpful interest to students of the art. It may be accepted that cores produced by the blowing method will be more uniform in structure, lighter in weight, and higher in strength than those produced by other methods. They will be formed more perfectly, have a higher degree of permeability, and due to the smoother skins will impart a better finish to the castings. The core blowing machine itself is simple to operate, has few parts which are subject to wear, and within the scope of the equipment has the ability to produce quality cores at a high rate of speed and with maximum economy.

This is the second and concluding article by Mr. Lincoln on the problems encountered in the operation of core blowing machines. The first installment appeared in the February issue.

The Editors.

Adventures of Bill

(*Concluded from Page* 50)

of loose sand in the mold are carried along by the flowing stream of metal. In an open mold the metal develops a film on top more rapidly than it does in a closed mold.

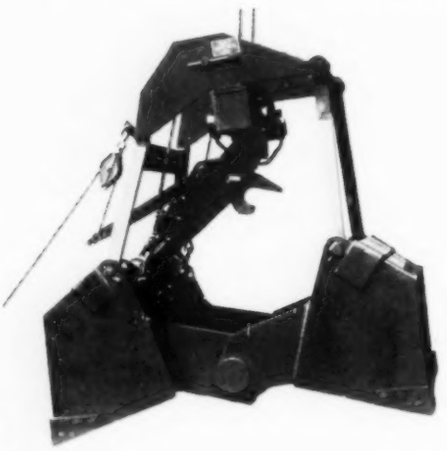
"In the presence of all these hazards small amounts of bubbles and dirt coalesce. Under exceptionally favorable circumstances they float to the top and the foundryman does not realize his narrow escape from disaster. In the majority of instances these patches of scum touch the inside or outside wall of the mold and become anchored in place. The rising metal flows past them and apparently is perfectly clean when it arrives at the top.

"Three methods are available in making the mold. In the first and preferred method, the cheek is lifted off and the inside and outside walls are black washed and skin dried. In the second method the cheek is lifted off and a coating of plumbago is brushed or rubbed by hand over the inside and the outside face. In the third method the mold is not parted and therefore additional precautions must be taken. The pattern can rest either on a number of dry sand cake cores, or on a 2-inch thickness of sand rammed on a coke bed. The facing and backing sand should be worked as dry as possible with moisture content approximately 4 per cent. The mold is vented with a ¼-inch wire about 1½ inches from the pattern inside and outside and down to the coke bed. A piece of flat dry sand core is bedded in each sprue opening to prevent the metal from washing sand in the mold.

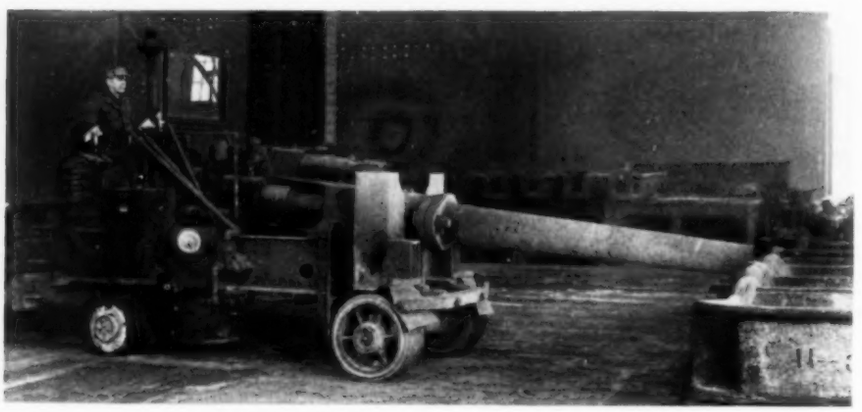
Finally two or three men armed with ¼-inch steel rods raised to a red heat by dipping them in the pots, stand above the open mold and watch the rising metal. They touch the rods to any foreign material floating on top. Just as the mold is filled they shove the rods almost to the bottom and move them back and forth once or twice close to the inside and outside wall. This will dislodge any barnacles. Causes for defective castings and proper preventatives are described in *Gates and Risers for Castings.*

PRESTO! Every Crane a Bucket Crane!

By throwing the hook block of the bucket over the hook of your regular crane, you immediately have a bucket crane, ready for instant operation. As in all BROSIUS products, the construction is simple but rugged. The latching mechanism consists of a single guide lever, a latch and a trip lever. It may be operated from the cage or the floor.



BROSIUS SELF CONTAINED AUTO FLOOR CHARGING MACHINE



2,000 TO 20,000 LBS. CAPACITIES

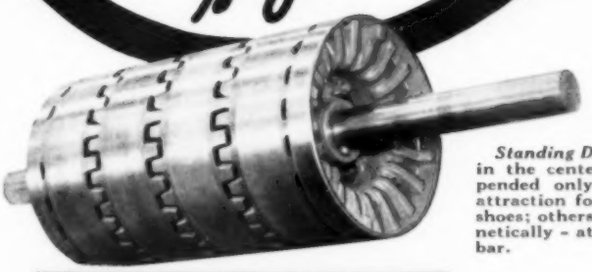
Built to operate in congested areas, this floor charger turns on its own wheel base, and requires no tracks or runway; all it needs is a good floor. It serves hammers, presses, furnaces, etc. Other models handle slabs, billets, ingots, and so forth.

Edgar E. Brosius, Inc.

Designers & Manufacturers

PITTSBURGH (Sharpsburg Branch) PA.

Still— THE MOST POWERFUL PULLEY on the market size for size



Standing Down! The man in the center is held suspended only by magnetic attraction for metal in his shoes; others hang to magnetically - attracted metal bar.

IT SHOWS WHY THE DINGS PULLEY IS MORE POWERFUL

Suspend a steel screw from string attached to support. Place steel spacer piece across pole ends of ordinary magnet—bronze or brass spacer across ends of similar magnet. With screw in center, move magnets toward each other at equal rate of motion.

Snap! Screw will jump and be firmly held at the bronze or brass spacer. Steel spacers short-circuit magnetic lines of force, weaken magnetic pull. Bronze spacers preserve magnetic strength, assure a stronger pull.

Bronze spacer rings are standard in Dings Pulleys, other manufacturers use steel.

Moreover, because heat destroys magnetic pull, Dings Pulleys have twice the heat-radiating surface of other pulleys.

Good reasons why Dings Pulleys are the most powerful on the market size for size!

Dings
MAGNETIC SEPARATION — HIGH INTENSITY

WHEN the illustration above was first shown as a visual demonstration of the tremendous pulling power of a Dings *High Intensity* Magnetic Pulley, it was captioned: "Dings Builds The Most Powerful Pulley on the Market size for size!" THAT STATEMENT IS STILL TRUE!

The Dings air-cooled Pulley gives you greater magnetic pulling power, GREATER IRON-REMOVAL POWER, than any similar unit.

Think of that in terms of cleaner foundry sand—elimination of sprues, risers, gates and shot iron—faster, lower-cost sand conditioning and better castings and you'll see that a new Dings Pulley will pay for itself in *your* plant. Now's the time to write for literature and recommendations.

DINGS MAGNETIC SEPARATOR CO.
675 Smith Street, Milwaukee, Wisconsin

SEPARATION HEADQUARTERS SINCE 1899

MODERNIZING YOUR FOUNDRY

(*Concluded from Page 37*)

The best type of modernization is that which is carried on regularly under a well organized plan, adding a new piece of equipment here, making a change in method there—with the net result that the foundry is nearly always in top shape and ready for any emergency.

In the November, 1938 issue of THE FOUNDRY an article by the author carried the following statement: "It is just fundamental for an improvement in business to follow a period of low rate of activity; it has always happened in the past and is sure to happen again—so getting ready for the active period ahead is just good business." Developments since the publication of that statement once again have indicated the soundness of that type of thinking.

To be understood, foundry modernization must be viewed from the management angle. Acknowledging responsibility of management, just how do we look at modernization?

As managers we are responsible for meeting our pay rolls, providing income to meet fixed charges and showing a profit. A basic problem is ability to forecast rates and terms of money, prices and profits. At present we can determine quickly that the supply and cost of money is no barrier.

Prices are another matter. On one hand we see the cost of raw materials in some instances holding firm and in other cases increasing. Probably some few items have been reduced, but not many. With respect to the price at which we sell our product, the report is not uncommon that the foundry industry is not recovering a sufficient amount to provide properly for meeting production costs and fixed charges, not to mention profit.

Find Efficient Ways

We can go a step further and find there are many new forms of taxes which we, as managers, can do little or nothing to change. Therefore, our long quest in search of methods brings us to this conclusion: We must find more efficient ways of doing things. Taking into account this current need for more efficient ways of doing things, we cannot help but be impressed with the opportunities that lie ahead in modernizing our foundries.

As we have seen there is little that managers can do to bring about a reduction in the cost of raw material prices, taxes, insurance, interest, and the other business costs. What then is there left for management to control? The outstanding opportunity is offered in productivity per dollar spent.

Modernization is the way to lower production costs. The economies brought about through that means, of necessity, offer more to management at the present time than was possible last year, or perhaps than may develop next year. With the uncertainties afoot, it definitely is necessary that management think and plan carefully to produce more out of the present foundry and not to increase productive facilities irrationally.

Magnetic Engineering & Mfg. Co., Clifton, N. J., recently has been organized to design a line of magnetic separators, magnetic ore concentrators, magnetic chucks and clutches and special magnetic equipment. Officers of the company are: J. J. Ferris, president; J. R. Hope, vice president, and F. E. Ferris, secretary-treasurer.

8 to 10

Can Wash At This ONE Washfountain Simultaneously

Yet No More Piping Connections Than for ONE Single Person Wash Bowl

Write for this helpful washroom layout "Plan Book"

HOT WATER
DRAIN
COLD WATER

● Two water pipes and one drain, only 3 piping connections are required for one 10-man Washfountain—30 are required for 10 wash bowls to serve the same number of persons.

This is but one of the reasons why these modern group Washfountains are rapidly replacing all other types of wash fixtures for factories, institutions, schools—wherever there are more than a score of people.

The running spray of water from the central sprayhead means maximum sanitation—self-acting drain prevents collection of water in the bowl and possible contamination,—70% less water is consumed,—and time of men is saved.

"Plan Book" to give you suggestions on efficient washroom layouts will be mailed on request. BRADLEY WASHFOUNTAIN COMPANY, 2217 West Michigan Street, Milwaukee, Wisconsin.

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United Steel and Wire Company
Royal Canadian Air Force
Magnolia Petroleum Company
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Gorton Machine Co.
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Hanes Hosiery Mills
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BRADLEY
WASHFOUNTAINS

U·S·S CARILLCO PIGLETS

...make better, more uniform castings at *lower cost!*

WHY? Because the size, shape and the method of making Carillco Piglets give them a finer, more uniform grain structure, of the exact analysis you order, shipment after shipment. They are free from kish, dirt, sand and other foreign matter.

Carillco Piglets weigh only about 40 lbs. Their small size* makes them easy to handle, permits even distribution of the iron in the furnace charge. Their uniform size tends to produce greater uniformity in melting.

Carillco Piglets cost less to use because their trapezoid-shaped cross-section exposes more surface per pound of metal, permits heat to reach the interior of the pig evenly from all directions. Heat is thus absorbed more rapidly. Carillco Piglets melt *quicker*, reduce your fuel bills.

Carillco Piglets are available in *all* ranges of silicon, from .75 to 4%—and manganese from .5 to 2%. They are well adapted not only to cupola practice, but also to air furnace operation as well—definitely reducing costs.

Remember, what you put in the charge will come out in your finished work—try Carillco Piglets and you'll never go back to ordinary pigs.

• • •

**Carillco Piglet dimensions: Top (or bottom as cast) 18" x 1¾". Bottom 21" x 4¾". Approximate weight 40 lbs. They are uniform in size.*

Southern Pig Iron in standard form, produced by Tennessee Coal, Iron & Railroad Company, Birmingham, Ala., is also available for shipment throughout the Northern and Southern states.

AMERICAN STEEL & WIRE COMPANY, *Cleveland, Chicago and New York*

CARNEGIE-ILLINOIS STEEL CORPORATION, *Pittsburgh and Chicago*

UNITED STATES STEEL

AVOID DEFECTS IN NONFERROUS FOUNDRY

(*Continued from page* 33)

of metal oxides in these alloys is not an increase in the pouring temperature.

It is much better to deoxidize these oxides by the addition of phosphor tin or phosphor copper. However, an overdose of deoxidizing agent is almost as bad as none at all, for the proper suspension of the lead. High lead copper base alloys are somewhat dependent upon the presence of a sufficient amount of oxides to form during solidification of the casting. Some oxides will retard the free flow of the low melting point constituents to the lower side of the casting, or to the skin of the casting, whichever direction offers the least resistance to flow.

An experienced manufacturer of these alloys will recognize when deoxidation by the use of copper phosphide has been carried far enough, due to the appearance of the bath as piece after piece of phosphor-copper is added. The experienced manufacturer also knows that he must stop adding deoxidizer before the bath indicates on its surface that typical completely deoxidized condition of the copper, tin, lead and phosphorus compositions.

With zinc present in these compositions, copper phosphide or phosphor-copper should be added to these alloys even more sparingly. In many instances a little zinc instead of phosphor-copper will serve satisfactorily if added intelligently; if the bath is well stirred and if the operator is well versed in the proper appearance on the surface of the bath when conditions are right. Where the metal has been melted and deoxidized properly, little trouble is encountered in casting high lead compositions. The gating system must prevent a squirting or a nozzle effect, and the risers must be constructed properly to feed the casting during solidification. Pouring temperature influences distribution of lead throughout the mass. A study of the right temperature for a given size casting will be found well worth the effort. The important factor is to have the metal right, pour it steadily and quietly, and at a temperature as low as conditions will permit.

Nickel Raises Melting Point

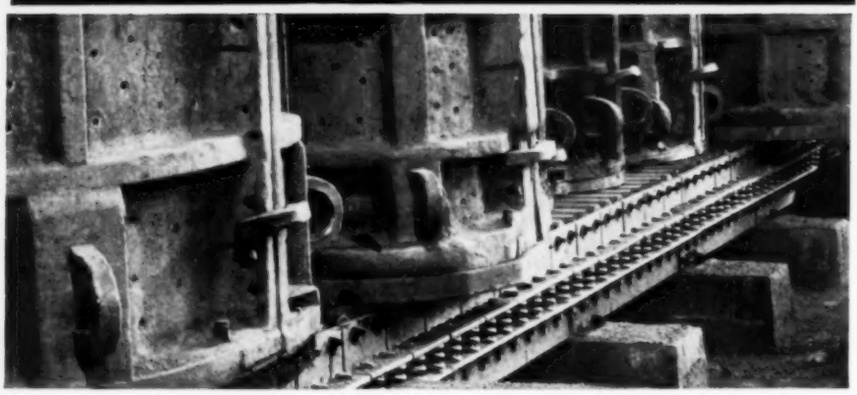
High lead alloys sometimes contain nickel. Presence of nickel raises the melting point. As the nickel content increases, the melting point also increases, although not in proportion. Increase in melting point raises the temperature at which the composition sets. The matrix sets at a higher temperature during cooling and thereby forms a sponge to hold the lead in place and prevent its accumulation at the bottom of the mold, or in other words, prevents the segregation of the lead.

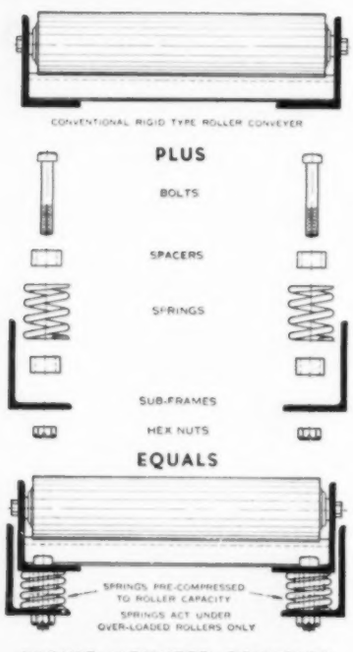
There are other methods of preventing segregation of lead in the high lead alloys. The important influence of copper oxide as a component of the composition is not sufficiently recognized, although many manufacturers of a high lead alloy use some fluxing reagent to increase the amount of copper oxides of the composition. They may not realize that the fluxes have this particular effect; but they do know the flux tends to reduce the segregation of lead and thereby to avoid the production of defective castings. However, the action of the flux is to increase the amount of copper oxide, the direct influence which prevents segregation and thereby helps to produce good castings with uniform distribution of the high lead throughout the section.

A number of fluxes are recom-

(*Continued on page* 104)

MATHEWS SPRING MOUNTED CONVEYERS





SPRING MOUNTED CONVEYER

CUT MAINTENANCE COSTS

THE principle is simple; the roller axles are rigidly locked in the frame as in the conventional "rigid type" construction, but the conveyer frame which retains the rollers is carried on pre-compressed coil springs. The springs are held in compression equal to the rated safe load of each roller. Under impact conditions or excessive loads the springs absorb the overload.

This construction represents the greatest improvement in roller conveyer in many years. Its application will reduce maintenance costs by prolonging the life of the equipment. When conditions are severe, "spring mounted" is the practical conveyer construction for the job.

Capacities from 150 lbs. to 8000 lbs. per roller available.

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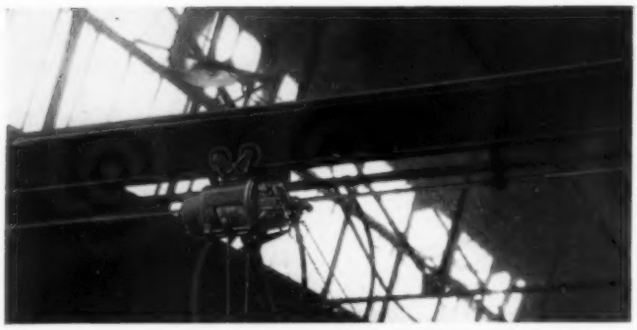
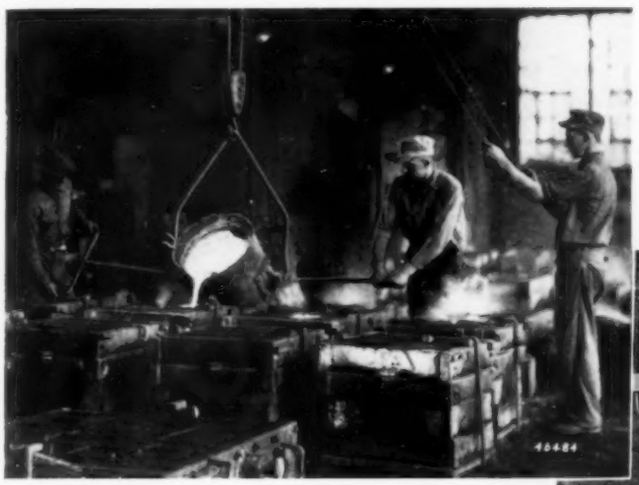
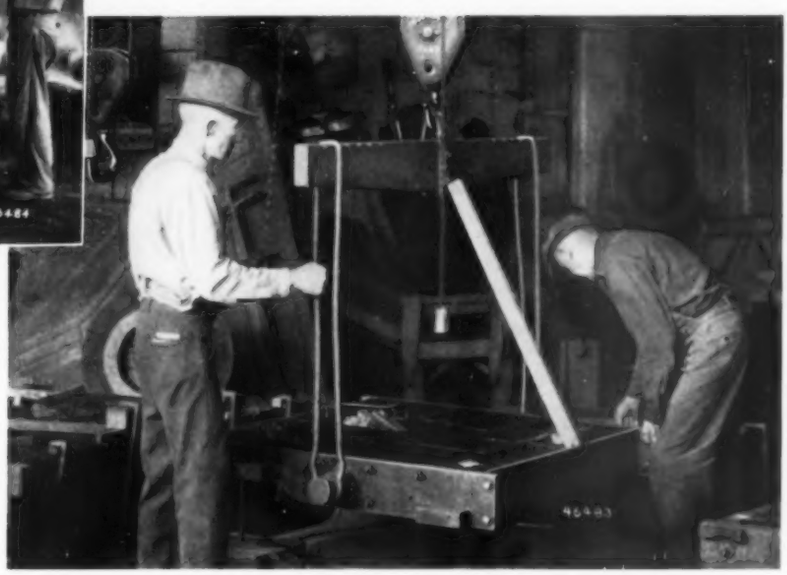
CONTINUOUS FLOW PRINCIPLE OF HANDLING MATERIALS



GIVE YOUR MOLDER A *Lift!*





For foundry service I-R Air Motor Hoists are unsurpassed. One of their most distinctive features is the automatic up and down stop. Another is their protection from the effects of heat and dust. Because these hoists are free from vibration and their control is so nicely graduated, they are especially fitted for such delicate work as drawing patterns and lowering a cope on to a drag.

In addition, I-R Industrial Air Hoist Motors can't be damaged by stalling from overloading. Many units are still performing daily service even after twenty years of tough service.

I-R Air Motor Hoists are built in nine sizes ranging in capacity from 500 to 20,000 pounds. Ask the nearest Ingersoll-Rand office for full information.

The I-R line of air tools for foundry work also includes chippers, core breakers, rammers, grinders, wire brush machines, etc., and also a complete line of air tool accessories.

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Tulsa
Washington

(*Continued from page* 102)
mended for this purpose. Barium sulphate heated in the presence of copper, reacts so that the oxygen given off combines with the copper to make copper oxide. Some fluxes offered by the manufacturers are said to help in the production of sound, high lead alloy castings. The effective agent is a chemical compound such as the barium sulphate mentioned. Remainder of the flux is not necessarily essential, although sometimes it does help under certain conditions.

The most trying problem in the production of sound, good, clean, high lead castings is the tendency of the heavy element, lead, to settle to the bottom of the mold during solidification. In some instances as gas moves toward the surface and opens up passage ways, the low melting point lead, or lead tin composition flows to produce an excessively high lead content at the surface or skin. These defects are corrected, by the presence of copper oxide. Too much copper oxide may be reacted upon by the presence of the lead to produce lead oxide or lead and tin oxides, if tin, as well as lead is present.

Presence of lead and tin oxides in excess of a reasonable amount, tends to make the composition very sluggish when pouring the castings. They also present many trying problems for the foundryman and must be compensated by the right kind of a deoxidizing agent, usually copper phosphide, or phosphor-copper. Sometimes phosphor-tin is used, but it is not as desirable. Tin costs more and it is not desirable to increase the tin content above the specification limit.

To avoid defects from sluggish high lead compositions, deoxidization must be done properly by the use of the right amount of phosphor copper. An excess of phosphor copper will give the trouble mentioned because an excess will produce a reduction in the percentage of copper oxides. Some copper oxide is essential to the proper and uniform distribution of the lead in small globules throughout a given section of the casting. Proper balancing of deoxidizers in the form of phosphor-copper or phosphor-tin, and an oxidizer in the form of a flux, such as barium sulphate, is an extremely important factor.

Need Metallurgical Control

It is particularly desirable that an experienced metallurgist should control the production of these compositions. One who has not had the right kind of experience and has not made a study of the subject cannot expect a high percentage of the best quality metal. It is important to control the percentage of oxygen present in the composition relatively accurately to insure the right amount of copper oxide being present and yet to insure a minimum amount of lead and tin oxide.

Yellow brasses also have peculiar characteristics. Special experience is required to secure the best results and a minimum defective loss. Yellow brasses are used regularly for ornamental castings that simply demand the right kind of color and good, clean castings that will polish well, or will present good appearance. The problem of making good castings is simplified materially by the use of a fractional percentage of aluminum in the composition. In almost all instances foundrymen use up to 0.15 per cent aluminum as an intentional element. The aluminum envelop formed over the metal as it is casting prevents the surface defects peculiar to yellow brass cast without that protection.

In casting yellow brass alloys containing aluminum, too much aluminum may give rise to serious trouble. An excessive amount definitely will increase the amount of scummy spots that may develop. These spots do not polish away readily in the usual buffing process.

(*Continued on page* 106)

The Fahralloy Company

Maehler car-type Core Oven used by The Fahralloy Company, Harvey, Ill., makers of quality alloy castings. Car is 6' wide, 12' long, 6'-6" high — average core load 3600 lbs. Hauck vaporizing oil burner averages only one gallon of oil for baking 450 lbs. of cores. Oven is fully automatic, practically self operative, safe.

Installed this MAEHLER CORE OVEN

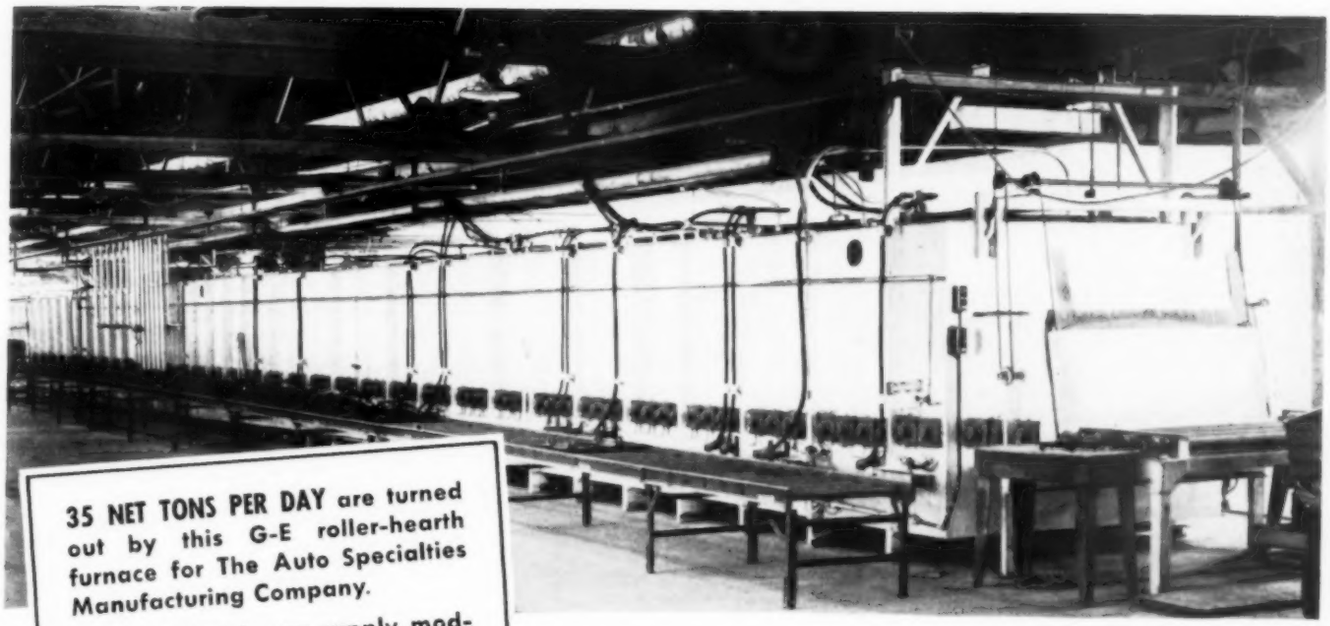
because:

1. CORES ARE UNIFORM: Large or small, light or heavy cores can be baked at the same time — all perfectly. There is no compromise between overbaking and underbaking. There is less waste in both cores and castings.
2. INCREASED PRODUCTION results from the Maehler System of re-circulated air-heat. Baking time is frequently reduced up to 50%!—more loads per day of better cores.
3. FUEL COSTS ARE LOWER — heated air is used over and over. Stack loss is cut way down. The better fuels can be burned with less over-all baking costs.

Translate these benefits into terms of your own core production and you'll see why it will pay you to install Maehler Core Ovens in your plant. Write for details today.

THE PAUL MAEHLER COMPANY
2200 W. Lake Street • Chicago, Ill.

50th ANNIVERSARY 1890 1940 MAEHLER



35 NET TONS PER DAY are turned out by this G-E roller-hearth furnace for The Auto Specialties Manufacturing Company.

General Electric can supply modern short-cycle malleable-annealing furnaces for single-chamber, two-chamber, or continuous operation, and in the right size for your production.

High-silicon Iron Annealed in 15 hours

with this G-E ROLLER-HEARTH FURNACE

THE castings are annealed in a protective atmosphere that prevents oxidation, and they pass through the furnace on driven rolls in lightweight trays. Hence, protective packing and heavy pots are eliminated. This greatly increases the speed with which the charge heats and cools; improves working conditions; decreases the time required for loading and unloading; cuts days from the annealing cycle.

This furnace is also built with fast-cool chambers between the high-temperature and low-temperature chambers, and between the low-temperature chamber and discharge. This construction further shortens the time of the annealing cycle.

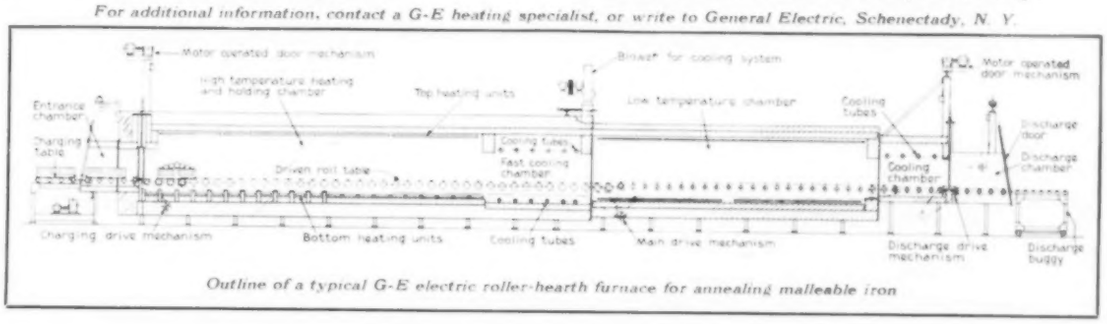
Maintenance Is Low—Trays and rolls, made of heat-resisting alloy, have long operating life. Rolls are supported outside the furnace by self-aligning bearings. Ribbon-type heating resistors are used.

Takes Small Floor Space—This big furnace turns out 35 net tons a day, yet is only 12 feet wide, including the table for returning empty trays, and 132 feet long overall.

Power Costs Are Low—It is very efficient, too, anneals high-silicon iron for 265 kw-hr per net ton.

Assures Uniform Product—It gives uniform temperature distribution, and accurate control of the time-temperature cycle—will automatically maintain the same conditions day after day.

For additional information, contact a G-E heating specialist, or write to General Electric, Schenectady, N. Y.



Outline of a typical G-E electric roller-hearth furnace for annealing malleable iron

GENERAL ELECTRIC

675-1

(*Continued from page* 104)

Particles of these scum spots, when entangled in the buffing wheel, often are abrasive and frequently produce scratches that demand further buffing for their removal. Therefore, it is desirable to maintain the aluminum content at the very lowest point that will produce the desired results, a strong protective envelop around the metal as it expands to fill the mold cavity.

Excess aluminum also may cause folds that cannot be polished out at all. The defect may appear as a fine hair line, but if the casting is fractured it will show a definite area of cleavage similar to a cold shut. This condtion is similar to the folding in of the envelop in the aluminum bronzes. This type of defect means definite rejection of the casting. There is no possible way of removing the fold without removing an excess amount of metal, or in some instances cutting clear through the casting.

Tendency to form these folds is not entirely due to an excess amount of aluminum. It more often is due to a combination of poor gating and poor pouring. The moment castings develop this form of defect a study should be made of the way the metal flows into the mold. Necessary changes either in pouring or gating, will allow the metal to enter the mold steadily and inflate the envelop continuously without folding any of it into the surface.

A convenient method of studying this condition is to cut a hole through the cope over the point where the folding occurs, if it is regularly in the same spot, and through the hole watch the metal flowing into the mold. Many times surprising conditions are seen and the correction is immediately obvious. Turbulence of the metal in the mold cavity absolutely must be avoided. Metal spilling over sharp corners is a prolific source of turbulence. Therefore, gating must cause the metal to rise rather than fall over the edges or corners in the mold cavity.

Increases Leak Tendency

In another group of yellow brass castings subjected to leakage pressure test, the presence of aluminum seems to increase the tendency to leak. It is commonly agreed that for castings to resist leakage, yellow brasses must be free from aluminum or silicon. Common defects in these alloys are much the same in almost all nonferrous alloys, with the exception that these particular alloys develop smoke spots. Some of these smoke spots actually leave depressions in the surface after the castings have been sandblasted or water tumbled. The depressions are filled with zinc oxide, removed by the blasting or water tumbling process. This zinc oxide is developed within the mold during the pouring of the casting. Zinc vapors that enter with the metal, or that rise from the metal after it has entered the mold, are oxidized by the heated air and deposited on the surface of the mold. As the metal fills the cavity, it finally flows over the spots of deposited zinc oxide.

Correction for this condition is obvious, and in a general way has been discussed previously. The metal should be poured so strongly that the metal enters the mold with considerably force. A strong stream of metal flowing into the mold will force ahead of it all the vapors developed during the pouring process. Forceful pouring also tends to reduce the time for filling the mold cavity. Consequently, the time available for the oxidation of the vapors is reduced and the amount of zinc oxide which might be deposited, is reduced.

Sometimes it is desirable to reduce the time needed for filling a mold cavity by increasing the number of gates or orifices through which the metal may enter. If these are increased, the sprue must be

Stearns

COOL

Because They're Ventilated

Magnetic Pulleys

are the choice of more and more foundry engineers

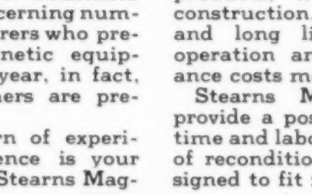
We are proud of being selected by leading engineering and equipment supply firms to furnish STEARNS Magnetic Pulleys and separators for foundry installations.

An indication of STEARNS prestige is the discerning number of manufacturers who prefer Stearns magnetic equipment year after year, in fact, our best customers are previous buyers.

Progress is born of experience and experience is your best protection. Stearns Magnetic set the pace in scientific magnetic pulley construction back in 1917 . . . Stearns Magnetic exclusively introduced the air-cooled magnetic pulley in 1922 . . . Stearns Magnetic has used the unit one-piece integrally cast magnet body since 1924.

The many new, exclusive and pioneer improvements built into Stearns magnetic products, their time proven construction, dependability and long life, economy of operation and low maintenance costs mean much to you.

Stearns Magnetic Pulleys provide a positive, automatic, time and labor savings method of reconditioning sand. Designed to fit into your conveying system and also available in complete portable separator units adaptable for sand slinger and many other uses.



Our Bulletin 301 on Magnetic Pulleys is yours. Write for it.

STEARNS MAGNETIC MFG. CO.

Formerly Magnetic Mfg. Co.

SEPARATORS DRUMS ROLLS CLUTCHES BRAKES MAGNETS

HIGH STEARNS DUTY

LARGEST EXCLUSIVE BUILDERS OF MAGNETIC EQUIPMENT

662 So. 28th Street Milwaukee, Wis.

increased in capacity so that all gates may be kept full. Pouring speed and volume of metal must be increased proportionately so that the sprue is maintained in a filled condition during the entire process of pouring. Otherwise considerable defective castings will be obtained.

Pouring metal through sprues of the wrong size is a prolific source of defects in this particular series of yellow brasses. Such sprues permit air to enter the mold along with the inflowing metal. This air becomes heated and reacts with the metal to increase the scum and oxides, and in some instances actually damages the mold by sudden expansion due to temperature change and consequent rush over delicate parts of the mold.

Sound yellow brass castings depend upon good, clean metal properly melted and properly poured at the right temperature. Clean casting surfaces depend upon good pouring, clean molds, good sand permeability, proper control of moisture content in the sand, and gating that will insure rapid filling of the mold and free escape through the riser of all gases and vapors without undue resistance to their passage. In small castings, such as gas cocks and similar small parts of course no risers are necessary, but ample vents through the cope and drag of the mold are imperative if a high percentage of good castings is to be maintained.

Skim the surface of the metal thoroughly before beginning to pour. Pour with a strong stream sufficient to fill the riser and maintain it at a full condition throughout the pouring process. Heavy sections in yellow brass castings require ample risers to insure proper feeding, otherwise shrinkage will cause serious defects, particularly if the castings are to be subjected to pressure. Castings that have not been fed properly are prone to leak under pressure after they have been machined.

This is the fourth and concluding article of a series by N. K. B. Patch, covering the causes of defects in nonferrous castings, with suggestive corrective and remedial measures. The first section appeared in the December, 1939 issue and the second and third in the January and February, 1940 issues of The Foundry.

The Editors.

Book Review

Metallurgie (Metallurgy), by R. Cazaud, fabrikoid, 389 pages, 3¾ x 5¾ inches, published by Dunod, Paris, France.

This is the fifty-fifth edition of a well known handbook on metallurgy which is printed in French. It is divided into seven sections concerned with various phases of metallurgy. The first part deals with general metallurgy containing information on metallurgical agents, metallurgical furnaces, and equipment and processes for electrometallurgy. Part II describes methods of tests for metals while part III is concerned with heat treatment, and thermochemical treatment. Part IV relates to metallurgy of ferrous materials, and part V discusses metallurgy of nonferrous products. Parts VI and VII cover metallurgy of precious metals and special metals such as chromium, molybdenum, tungsten, manganese, vanadium, etc.

Plant Is Destroyed

Plant of the Pittsburgh Crushed Steel Co., Pittsburgh, recently was destroyed by fire. Requirements of customers are being supplied from the two Ohio plants of that company. The company has not decided definitely whether to rebuild or to go into an entirely new plant in the Pittsburgh area. Temporary headquarters are at 603 Peoples East End building.

Therm-O-flake
COATING
SUPERIOR HIGH TEMPERATURE INSULATION

Keeps heat inside, with a coating of plastic insulation.

One inch thickness equivalent to about nine inches of fire brick wall in insulation value.

More economical in cost and installation, on existing furnaces, than walls of insulation brick.

Easily applied and largely reclaimable for re-use, after removal.

Most widely used material for high temperature insulation, up to 2000°F.

•

Write for Information and Prices

Other Therm-O-Flake Products
Made from Exfoliated Vermiculite
Granules, Brick, Block, Concrete

Illinois Clay Products Company
JOLIET, ILL.

FOUNDRY ACTIVITIES

PONTIAC PATTERN & ENGINEERING CO., Pontiac Mich., has installed equipment for production of 80 tons monthly of special alloy gray iron. Albert Weber is president and general manager.

* * *

Kinney Iron Works, 2525 East Forty-ninth street, Los Angeles, is constructing a foundry building at a cost of $1100.

* * *

Northfield Foundry & Machine Co., Northfield, Minn., recently re-elected officers at its annual meeting: President, Mike Machacek, vice president, George Machacek, secretary, Elsner Machacek, treasurer, Oliver M. Machacek. The company has been enjoying good business and now is operating close to capacity.

* * *

Youngstown Alloy Castings Corp., Youngstown, O., has appointed Bertram Brady Co., 549 West Washington boulevard, Chicago, as district sales representatives.

* * *

Certificate to conduct business under the firm name of Rhea Alloy Foundry, at 1651 Compton avenue, Los Angeles, has been issued to the owner, James A. Rhea.

* * *

Waukesha Foundry Co., Waukesha, Wis., has completed a $50,000 combination office and machine shop building. According to R. F. Smith, vice president and general manager, a $35,000 building for a new aluminum foundry may be built this summer.

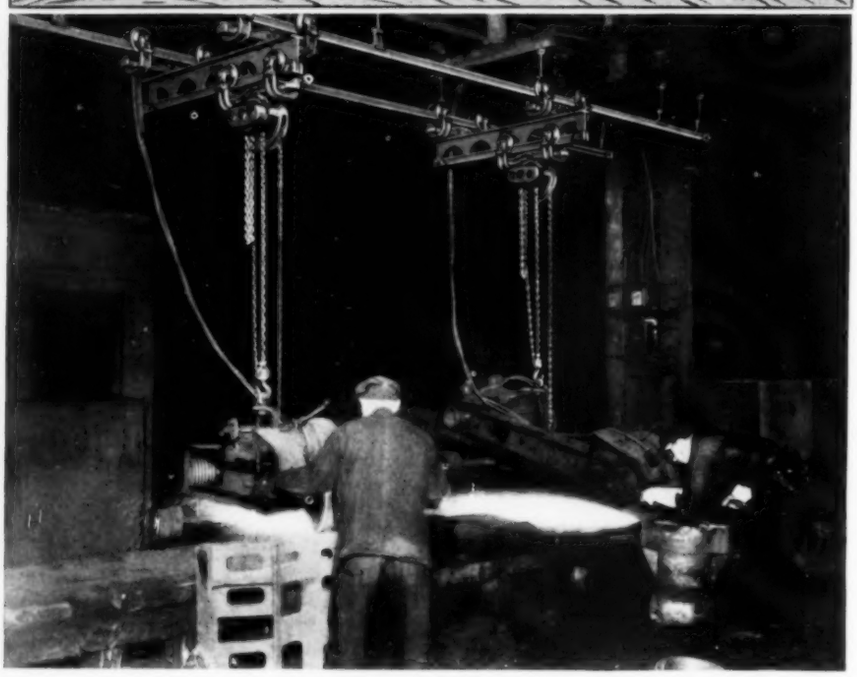
* * *

Webb City & Carterville Foundry & Machine Works, 402 East Broadway, Webb City, Mo., recently remodeled its entire plant and added a department to manufacture commercial laundry and dry cleaning equipment. C. H. Bentley is general manager.

RAW MATERIAL PRICES
Feb. 15, 1940

Iron	
No. 2 foundry, Valley	$23.00
No. 2 Southern Birmingham	19.00
No. 2 foundry, Chicago	23.00
No. 2 foundry, Buffalo	23.00
Basic, Buffalo	22.00
Basic, Valley	22.50
Malleable, Chicago	23.00
Malleable, Buffalo	23.50
Charcoal iron, furnace	27.00
Coke	
Connellsville beehive premium	$5.75 to $6.30
Wise county beehive coke	5.50 to 6.50
Detroit by-product delivered	11.00
Scrap	
Heavy melting steel, Valley, No. 2	$16.00 to $16.50
Heavy melting steel, Pittsburgh, No. 2	16.00 to 16.50
Heavy melting steel, Chicago, Auto No. 2	12.50 to 13.00
Stove plate, Buffalo	13.00 to 13.50
Stove plate, Chicago	9.00 to 9.50
No. 1 cast, mchy., New York	15.50 to 16.00
No. 1 cast, mchy., Chicago	14.50 to 15.00
No. 1 cast, Pittsburgh	17.50 to 18.00
No. 1 cast, Philadelphia	19.50 to 20.00
No. 1 cast, Birmingham	15.00
Car wheels, iron, Pittsburgh	19.50 to 20.00
Car wheels, iron, Chicago	16.50 to 17.00
Railroad malleable, Chicago	18.50 to 19.00
Malleable, Buffalo	16.50 to 17.00
Nonferrous Metals	**Cents per pound**
Castings copper, refinery	10.87½
Straits tin	45.62½
Aluminum, 99 per cent	20.00
Aluminum, No. 12 (Secondary, standard)	14.50 to 15.00
Lead, New York	5.00
Antimony, New York	14.00
Nickel, electro	35.00
Zinc, East St. Louis, Ill.	5.50

OPERATES SMOOTHLY in ABRASIVE BLASTS



Even where the atmosphere is churning with grit and dust, Cleveland Tramrail cranes with sealed bearings, hard chilled-tread wheels, and high carbon flat raised-tread rails operate smoothly and easily.

Swing-type grinders provide a real test for the short-span Cleveland Tramrail cranes on which they ride.

In blasting, piercing storms of penetrating grit and dust, these cranes continue their smooth and easy operation — even after years of service.

Tough jobs like these are not only convincing proof of the design, workmanship and quality materials built into every piece of Cleveland Tramrail equipment, but also demonstrate the inherent correctness of locating materials handling machinery above and away from areas where dust conditions are worst.

Whatever your material problems are, consult Cleveland Tramrail. Thousands of installations of nearly every description are bound to suggest ideas which should be helpful to you.

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
1155 Depot Street Wickliffe, Ohio

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT
Other products: CLEVELAND CRANES and STEELWELD MACHINERY